HP LP3065 Flat Panel | BFG 8800 GTX OC Water Cooled Edition | Netgear X103 | Creative Xmod

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COMPUTER POWER USER

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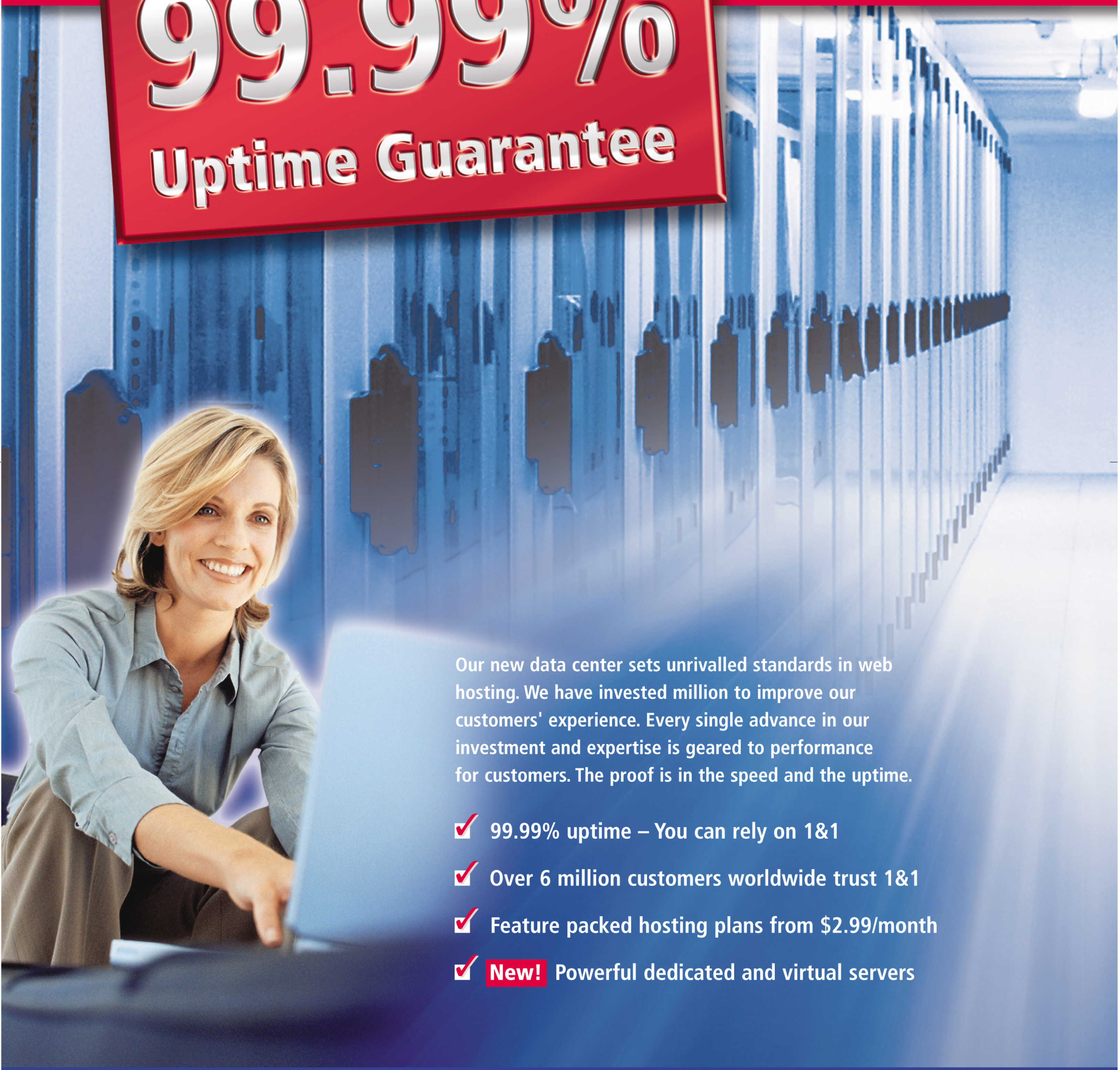
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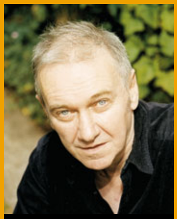
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Did you find the hidden *CPU* logo on our cover? Turn the page for the answer.

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CORRECTIONS:

The browser feature comparison chart on page 78 of the February issue incorrectly indicates that IE7 does not provide the option to restore previously open documents.

Infinite Loops

Strange stats and other oddball items from computing's periphery

84, 95, 98

EDITOR'S NOTE

Overclocking. That single, simple word is one of the biggest dividers between people who really love computers and tinkering with them and the average computer user, who looks at computers as mere conveniences akin to microwaves and cell phones. Say "overclocking" to most of those folks and all you'll get are blank stares. But for users who aren't satisfied with just buying an OEM box and accepting its performance as is, overclocking is where it's at.

We talk a lot about overclocking in *CPU*, and we overclock many of the core PC components that we review because we know that many if not most of you will want to overclock them the moment you have them installed, as well. But we recognize that not everyone is an overclocking veteran; we get email all the time asking for specific advice on how to squeeze the most performance out of a CPU, or a video card, or some RAM. Unfortunately, we can't answer all of 'em individually. That's why we included some overclocking info for users of all experience levels this month in our Spotlight section on cranking up your PC's performance. Beginning OCers will find some helpful advice on getting things going, and intermediate-through-advanced tweakers will get more handy tips on taking performance to the next level. We also have a slew of tips on tweaking your OS and various apps to make things run faster and smoother, as well.

Speaking of performance and tweaking, we just got back from attending PDXLAN in Portland, Ore. For those of you in the lovely Pacific Northwest who are unaware of PDXLAN or haven't attended, this is a fantastic event packed with great people and cool tech. *CPU* was a sponsor this year, and we hosted a case-modding contest that we'll be telling you more about next issue. For the moment let me just say that everyone who entered the contest put ridiculous amounts of work into their rigs, and the results were impressive. We'll show you our top five finalists in the May issue, and the winner—which is a work of art *and* is loaded to the gills with hardcore parts—will be on our cover.

Until then, enjoy the performance tips along with our lineup of reviews, columns, and monthly features, and we'll see you again next issue.

Chris Trumble, Publication Editor, *CPU*

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Gotcha.
Here it is.

NVIDIA SLI READY

EPP Enhanced Performance Profiles

Cool Performance

HOW CORSAIR MAINTAINS TECHNOLOGY LEADERSHIP

CORSAIR

INNOVATION

PERFORMANCE

RELIABILITY

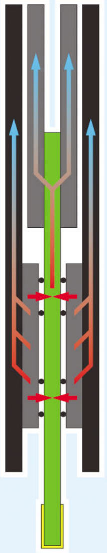
Here's the latest in Corsair's ten year heritage of innovation in performance memory: we've redefined memory heat sink technology. And the result is unprecedented performance and reliability. When we ran a preview module through system benchmarks at COMPUTEX, an overclocked DHX module with our optional airflow fan was able to hit a heart-stopping 1250MHz (PC-10,000) while maintaining cool, reliable performance.

Protect Components While You Push Performance

Pushing performance specs generates heat, and that can compromise reliability and component life. The advanced cooling ability of DHX heat sinks keeps your memory safe and reliable even as you push it to the limit. Under the name XMS2 Dominator, this DHX technology will be showing up on both Corsair parts designed for extreme overclocking and on memory designed for performance computing and gaming.

Also Featuring Enhanced Performance Profiles (EPP)

As with all new Corsair performance memory, XMS2 Dominator modules feature EPP, the new open standard for the Serial Presence Detect (SPD) jointly developed by NVIDIA and Corsair. EPP simplifies overclocking for beginners and provides unparalleled control for experts.



AIRFLOW

An optional fan (not shown) provides even more cooling and protection.

DHX DUAL-PATH HEAT XCHANGE

Corsair's proprietary DHX technology dissipates heat two ways: it draws heat away from the module through the RAMs and provides an additional path for heat transfer within the module through the ground plane!

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What's Happening • Hardware

Compiled by Blaine Flamig

Mickey Mouse Goes Flashing

Just when we thought we'd seen every possible USB flash drive concoction known to removable memory, along comes Buffalo Technology's new Disney-flavored RUF2-DF512NR series. We won't even attempt to guess how much Buffalo forked over in licensing fees to turn out these Steamboat Willie, Pooh, and Stitch keydrives, but you'd think it could have done better than tapping them out at a puny 512MB. Still, you know Disney freaks worldwide will litter eBay in droves with desperate bids to acquire one, which may be difficult considering Buffalo plans to limit sales to 5,000 units for each character. If you're among the cult of Walt, that's your own business, but the drives should be selling in Japan as you read this at a yet undisclosed price. ▲

Jobs Sings The DRM Blues

Love or hate Apple's hype man, you have to admire Steve Jobs for spitting right in the eyes of the Warner, EMI, Sony, and Universal record labels via an open letter (www.apple.com/hotnews/thoughtsonmusic) calling for the dismantling of DRM protection of digital music. Although EMI is at least experimenting with the idea, as you'd expect, the RIAA and other labels aren't as keen on the idea, with Warner Music's head, Edgar Bronfman, saying Jobs' suggestion is "without logic or merit." As for Apple's own built-in protection, Jobs says he'd drop FairPlay "in a heartbeat" if the labels would license tunes without forcing online stores to enforce DRM. On another Apple front, RIM's CEO Jim Balsillie and Symbian's CEO Nigel Clifford were separately quoted as saying the iPhone doesn't pose a threat to RIM's BlackBerry Pearl or Symbian's leading mobile OS market share. We'll soon find out. ▲

Asus Takes The GeForce 8800GTX Swimming

Attention enthusiasts, focus your eyes on the high dive, Asus is hoping to make a splash with its new and insanely long-windedly named EN8800GTX AquaTank/HTDP/768M graphics card. Boasting 11% faster graphics and 12-degree-Celsius lower temps over its generic brother, the EN8800GTX comes with the GPU overclocked from 575MHz to 630MHz with the help of the integrated, all-in-one watercooler. Additionally, Asus bumped the memory clock from 1.8GHz to 2.06GHz. You'll need to make some room in the pool, however, as the card requires one PCI slot alone for the watercooling unit. Asus has yet to detail when you can dive in and for how much. ▲

Michael Dell Gets Back In The Saddle

Look who went and got himself back on his horsey. With reports swirling that Dell is hurting financially, Michael Dell recently came in from the pasture to saddle back up as Dell's chairman and CEO, replacing former head wrangler Kevin Rollins. Among the many fences Dell needs to tend to are an SEC investigation concerning accounting improprieties, backlash from the gigantic Sony-related battery recall last year, investor lawsuits centering on alleged illegal rebate kickbacks from Intel, Dell relinquishing its top spot in the PC sector to HP, and the recent resignation of Senior Vice President John Hamlin. In a possible step in the right direction, Dell recently brought Michael Cannon, former Solectron CEO, into its bunkhouse as president of global operations. ▲

Hardware Mole

Unreal Engine 3 For The Wii?

Don't hold your breath because it's not going to happen, at least according to Epic's Mark Rein, vice president of Epic Games. In a recent interview with *Wired*, Rein said that although Epic already has a presence in the Wii space (specifically Red Steel, Splinter Cell, and Brothers In Arms), those games are based on the previous Unreal engine. "But it's not in our plans to bring Unreal Engine 3 to the Wii," Rein says. Rein did say porting the engine over is doable (and one unnamed Epic licensee is already doing it), but don't expect Epic to focus on it, citing the engine is designed for next-gen, high-definition purposes. Score one for the PS3. ▲

Sony Joins The iPod Circus

When business is hurtin', a company has to do what a company has to do. Case in point is Sony's CPF-IP001 Cradle Audio System for iPod, a new stereo dock for various iPod video, nano, and mini versions. Yes, you read that correctly—a new iPod dock from Sony. Actually, the thin, triangular CPF-IP001 is fairly attractive, although pricey at $249.99. The dock comes in two pieces, with the speakers outputting 5-watt audio and a separate sub pumping 15 watts of juice. A remote is included, and in a smart move by Sony, there's an additional line input so you can use the CPF-IP001 with other players. ▲

Track Shoes That Really Track

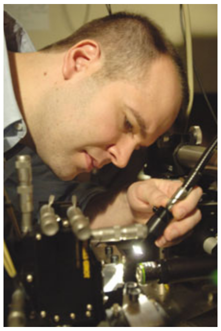
It took two years of research and millions of bucks to develop the Quantum Satellite Technology-based Isaac Daniel Compass Global track shoes, which could be on shelves in adult sizes as you read this. The real force behind the shoes' development, however, was developer Isaac Daniel's 8-year-old son who went missing after school one day in 2002. Although the boy was soon located, Daniel, an engineer, nonetheless set to work on the tennies, which include a GPS chip in the bottom that activates with a push of a button. Tracking the wearer's location occurs via a 24-hour monitoring service that runs $19.95 a month. Starting at about $325, the shoes aren't cheap, but the peace of mind they could provide parents and caretakers of, say, an Alzheimer's patient is priceless. ▲

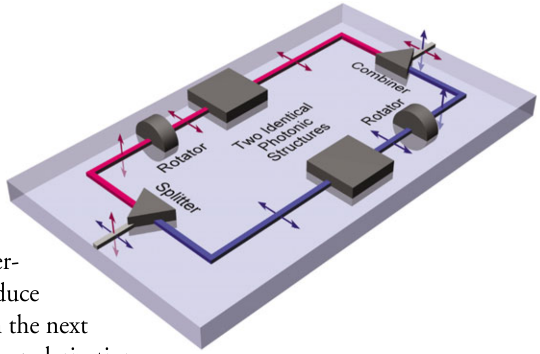
One Dedicated MP3 Player

As a standalone MP3 player, Tascam's 1GB MP-GT1 ($200) doesn't appear all that special on the surface. It only stores 240 MP3s at 128Kbps (four minutes each), and its 128 x 64-res screen certainly will not overwhelm you visually. Plug an axe into the MP-GT1's line-in port, however, and we are whistling a whole different tune. Besides including an integrated tuner and metronome, the MP-GT1 lets you slow down tracks without changing the pitch so you can learn those really hard guitar licks at your own pace. Additionally, you can loop and temporarily wipe out guitar parts, plus tap into numerous effects. Rock on, shredders. ▲

Compiled by Dean Takahashi

MIT Researchers Put Optics On A Chip





Researchers at MIT have come up with a way to integrate photonic circuitry on a silicon chip. Trying to integrate the high speeds of lasers with the low costs of traditional silicon chips, or putting "optics on a chip," has been a goal for scientists for a long time. Erich Ippen, an MIT electrical engineering and physics professor, says manufacturers could mass-produce the integrated devices and use them in supercomputers within the next five years. To date, photonics devices have been sensitive to the polarization of light. It is easy to polarize light waves moving through optical fibers in random ways, but this makes them unreliable. The MIT method separates light waves into either horizontally polarized beams or vertically polarized beams, which researchers say they can rejoin as needed later on. The result of this polarization of light is that researchers can build optical components into silicon chips, which are easier to mass produce. ▲

Stream Processors Unveils Breakthrough DSP Architecture

After more than eight years of research at Stanford and MIT, SPI (Stream Processors, Inc.) is introducing a new type of DSP (digital signal processor) chip that makes it easy to program a highly parallel device. SPI's Stream Processor Architecture can achieve more than 512GOps (giga operations per second), or 10 times the performance of today's DSPs, says co-founder Brucek Khailany, the principal architect. The Stream Processor chip uses a C programming model and is capable of encoding H.264 high-definition, 1080p video in real time. With more than 80 arithmetic logic units on a chip, the Stream Processor can also process a variety of multimedia signals simultaneously. This new DSP could replace a number of custom chips in high-speed printers or video processing machines, says Bengt Christensson, vice president of business development. ▲

Watching The Chips Fall

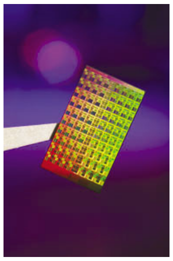
Here is pricing information for AMD and Intel CPUs.

*Retail price
** Manufacturer's price per 1,000 units
Other current prices, if indicated, are lowest OEM prices available through Pricegrabber.com

CPU	Released	Original price	Last month's price	Current price
AMD Athlon 64 X2 Dual-Core 4600+ energy efficient	5/16/2006	$601**	$199	$199
AMD Athlon 64 X2 Dual-Core 4600+ AM2 only	5/31/2005	$803**	$219	$219
AMD Athlon 64 X2 Dual-Core 4800+ energy efficient	5/16/2006	$671**	$349	$499
AMD Athlon 64 X2 Dual-Core 5000+ AM2 only	5/23/2006	$696**	$268	$215
AMD Athlon 64 X2 Dual-Core 5200+ AM2 only	9/6/2006	$827**	$279	$229
AMD Athlon 64 X2 Dual-Core 5400+ AM2 only	12/12/2006	$485**	$485**	$495
AMD Athlon 64 X2 Dual-Core 5600+ AM2 only	12/12/2006	$505**	$505**	$335
AMD Athlon 64 FX-62	5/23/2006	$1,031**	$599	$550
AMD Athlon 64 FX-70	11/30/2006	$599/pair	$324/pair	$304/pair
AMD Athlon 64 FX-72	11/30/2006	$799/pair	$450/pair	$417/pair
AMD Athlon 64 FX-74	11/30/2006	$999/pair	$550/pair	$520/pair
Intel Pentium Processor Extreme Edition 955 3.46GHz dual-core	12/27/2005	$999**	$875	$875
Intel Pentium Processor Extreme Edition 965 3.73GHz dual-core	3/22/2006	$999**	$975	$968
Intel Pentium 4 661 3.6GHz 2MB cache 800MHz FSB 65nm	12/27/2005	$401**	$159	$169
Intel Pentium D 920 2.8GHz dual-core 2MB 800MHz FSB 65nm	12/27/2005	$241**	$139	$129
Intel Pentium D 930 3GHz dual-core 2MB 800MHz FSB 65nm	12/27/2005	$316**	$142	$155
Intel Pentium D 940 3.2GHz dual-core 2MB 800MHz FSB 65nm	12/27/2005	$423**	$165	$183
Intel Pentium D 950 3.4GHz dual-core 2MB 800MHz FSB 65nm	12/27/2005	$637**	$231	$246
Intel Pentium D 960 3.6GHz dual-core 2MB 800MHz FSB 65nm	5/1/2006	$530**	$339	$324
Intel Core 2 Duo E6300 1.86GHz 2MB cache 1,066MHz FSB 65nm	7/27/2006	$183**	$174	$186
Intel Core 2 Duo E6400 2.13GHz 2 MB cache 1,066MHz FSB 65nm	7/27/2006	$224**	$223	$221
Intel Core 2 Duo E6600 2.4GHz 4MB cache 1,066MHz FSB 65nm	7/27/2006	$316**	$316	$314
Intel Core 2 Duo E6700 2.66GHz 4MB cache 1,066MHz FSB 65nm	7/27/2006	$530**	$506	$511
Intel Core 2 Duo X6800 2.93GHz 4MB cache 1,066MHz FSB 65nm	7/27/2006	$999**	$910	$910
Intel Core 2 Extreme quad-core	11/14/2006	$999*	$994	$978

Intel Creates 80-Core Microprocessor That Hits 1TFLOP

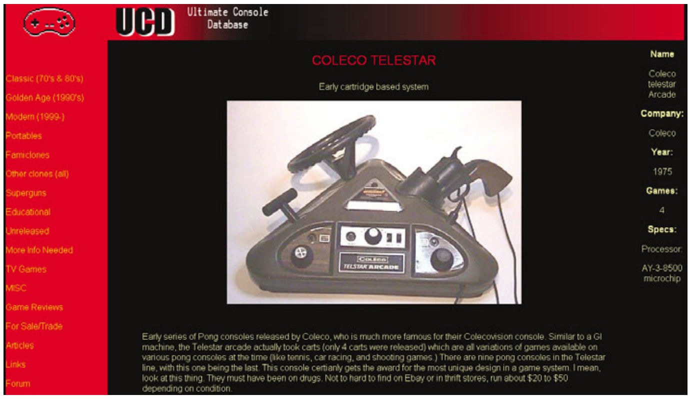
Intel recently showed off an 80-core microprocessor that it designed as part of a research project. The chip can deliver about 1TFLOP of performance running on 62 watts of power, or about as much work as a 2,500-square foot supercomputer could do a decade ago, says Justin Rattner, CTO at Intel. The chip measures 275mm squared, which is by far larger than the typical 143mm squared Core 2 Duo microprocessor shipping today. Because of its large size, an 80-core microprocessor isn't easy to manufacture, meaning manufacturers must miniaturize it before they can use it in servers or PCs. Intel built the chip with 100 million transistors in its 65nm manufacturing process, and each core, or tile, has a processor and a router. ▲



What's Happening • Internet

Compiled by Blaine Flamig

The Mother Of All Gaming Console Sites



COLECO TELESTAR

Early cartridge based system

Name: Coleco telestar Arcade

Company: Coleco

Year: 1975

Games: 4

Specs: Processor: AY-3-8500 microchip

Early series of Pong consoles released by Coleco, who is much more famous for their Colecovision console. Similar to a GI machine, the Telestar arcade actually took carts (only 4 carts were released) which are all variations of games available on various pong consoles at the time (like tennis, car racing, and shooting games.) There are nine pong consoles in the Telestar line, with this one being the last. This console certianly gets the award for the most unique design in a game system. I mean, look at this thing. They must have been on drugs. Not to hard to find on Ebay or in thrift stores, run about $20 to $50 depending on condition.

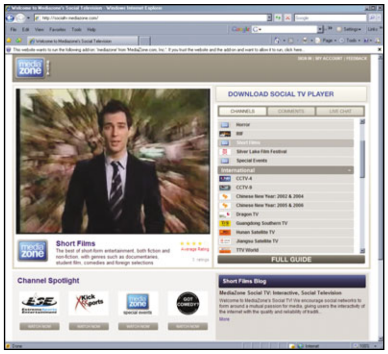
It's a bit strange that a Web site obsessively (maybe even disturbingly) devoted to cataloging every gaming console ever created has all the graphical flare of a two-crayon, grade-school art project, but damn if The Ultimate Console Database (ultimateconsoledatabase.com) isn't fun as hell, in a "man, that game was so choice!" kind of way. Organized into Classic (70s & 80s), Golden Age (1990s), Modern (1999 to present), Portables, Famiclones, Unreleased, and other categories, UCD currently houses details for more than 600 gaming systems. Throw in nostalgia-inducing photos, reviews, and a For Sale/Trade page, and gamers at heart may never make it out of this site alive. ▲

YSN.com Is All About You

So you're a recent college grad or just unsure where you want life to take you next. Perhaps YSN.com, a new social networking site for young professionals, can help. Still in beta, YSN.com aims to help the young and uncertain on their way up the corporate ladder by offering such tools as Self-Assessment (access your strengths, weaknesses, etc.), Portfolio (build and post your own on the site), Industry Q&A, Groups section (covering everything from In Transition to Science And Technology), and more. If you've already made it down the road to success, you can climb onboard as a Mentor at the site and spread your wisdom. If you're really with it, become a YSN.com Ambassador and earn such perks as a free iPod and audio books. The site is still in the growing stage, but we can see its potential. Heck, we may even join the Writer's Workshop group—not as a Mentor, of course; we've still got some growing up to do ourselves. ▲

Site Seeing

Movie Watching On Social TV



Short Films

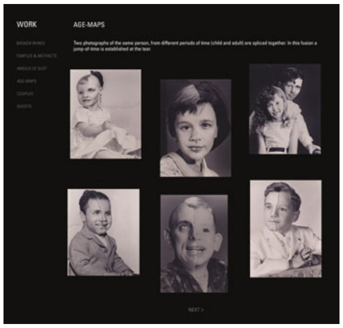
The best of short-form entertainment, both fiction and non-fiction, with genres such as documentaries, student film, comedies and foreign selections

MediaZone Social TV: Interactive, Social Television

Welcome to MediaZone's Social TV! We encourage social networks to form around a mutual passion for media, giving users the interactivity of the internet with the quality and reliability of tradit...

Yeah, we know, the world needs another social networking site like the hole in the ozone layer needs an expansion. Still, there's plenty of interesting and worthwhile content at MediaZone's Social TV site (socialtv.mediazone.com), including a channel devoted to the Silver Lake Film Festival (www.silverlakefilmfestival.org) held each year in Los Angeles (May 3rd to the 12th this year, if you're in the area). Additionally, the related Short Films channel features some excellent digital independent short flicks, including some of which likely to be featured at this year's MP4Fest Film Festival (www.mp4fest.org), now in its second year and held concurrently with the Silver Lake Film Festival. In case you're interested, the Silver Lake Film Festival has previously featured the work of Penelope Spheeris, Allison Anders, David Mamet, and others. ▲

Age-Maps: Turn Your Eyes Away If You Can



Two photographs of the same person, from different periods of time (child and adult) are spliced together. In this fusion a jump-of-time is established at the tear.

There's no hidden secret to how photographer Bobby Neel Adams created his Age-Maps (www.bobbyneeladams.com/age.html). He simply used two photographs of the same person taken as a child and as an adult and spliced them together to form one new photograph. Still, how Adams managed to morph otherwise normal individuals into nearly indescribably creepy, vacant, haunting, and painful figures is a mystery we can't begin to understand. By somehow playing on emotions that simultaneously draw you in and repel you, Adams has touched nerves within us we didn't know existed. ▲

Compiled by Blaine Flamig

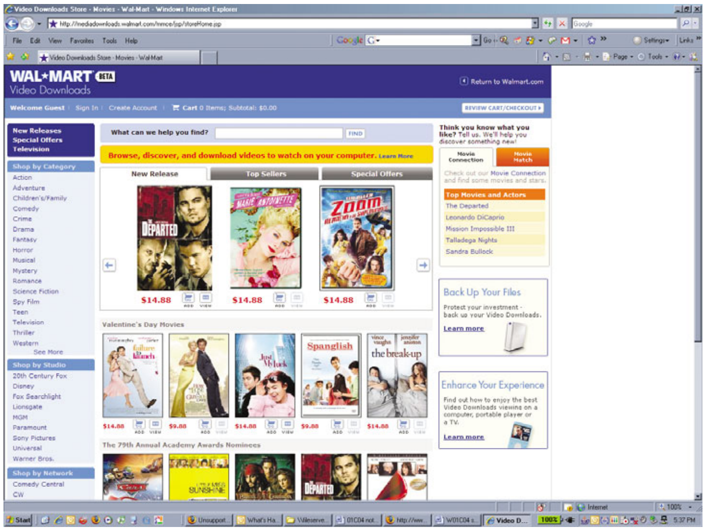
Is Novell A Traitor?

The FSF (Free Software Foundation), which maintains intellectual property rights relating to the Linux OS, is concerned enough about Novell's recent partnership with Microsoft that it's reviewing Novell's rights to sell upgrades of Linux operating systems that are covered under the upcoming GPLv3. The row started when Novell and Microsoft joined forces late last year, forging a business deal for the companies to jointly sell software and develop methods for businesses to use Linux and Windows side-by-side. Linux loyalists see the move as a means for Microsoft to go patent crazy in the Linux world. At press time, the FSF had delayed the release of GPLv3 (now expected in March) to make a decision on the matter. ▲

Russian Teacher Goes Free

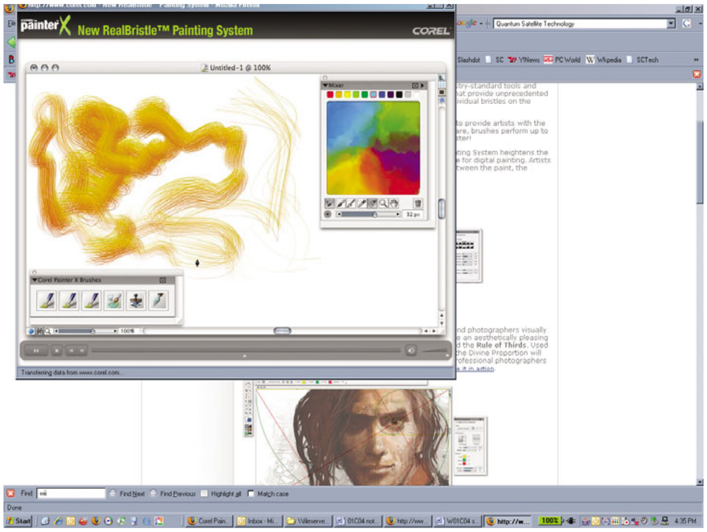
Alexander Ponosov won't be heading off to a Siberian prison camp, after all. That thanks to a Russian court rejecting a case brought against him by Russian law officials who accused him of using unlicensed versions of Windows and Office on a dozen PCs in classrooms. Prosecutors claimed Ponosov cost Microsoft upwards of $10,000. The judge in the case could have put the educator in the gulag for up to five years for violating intellectual property laws. Instead, he called the case trivial and insignificant. At one point during proceedings, former Soviet head Mikail Gorbachev came to Ponosov's aid, writing a letter to Bill Gates asking for mercy. Hmm. ▲

New To Wally World: Movie Downloads



You knew it was only a matter of time before Wal-Mart sat in the director's chair and started offering movie and TV downloads. Well, go ahead and yell "Action!" because the Wal-Mart Video Downloads service is a go, even if only in a beta version for now. Content is currently available from Disney, Lionsgate, Paramount, Sony Pictures, MTV, Nickelodeon, Warner Bros., and various Fox entities. But hold up, iPod owners (and owners of any Apple-based system, for that matter), you're not invited to the viewing. In related news, Amazon.com has announced plans to test its own Unbox on TiVo download service for viewing content on televisions. ▲

Corel Painter X



Corel's Painter has always been a high-octane illustration app, but the company's latest X version may be its finest masterpiece yet. Beyond Photoshop compatibility, a new palette color-matching tool, speed improvements, new composition tools with Divine Proportion and Rule of Thirds abilities (Art 101, people), and appreciated downloadable training videos, Painter X includes a RealBristle Painting System. The amazing tool can replicate the results of a paintbrush down to individual bristles. As Corel describes RealBristle, "art-ists can now faithfully replicate the sensation of the interaction between the paint, the canvas, and the brush." Virtual Picassos, man your easels. ▲

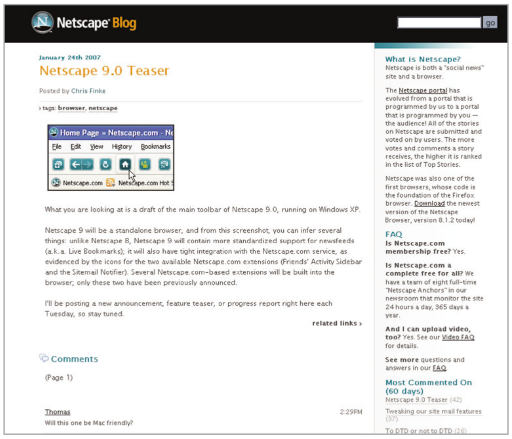
Software Shorts

Windows Home Server Hits Beta 2

Scads of MS employees and software and hardware partners numbering over 1,000 have begun testing the second beta release of the Microsoft's Windows Home Server. Sign-ups for additional testers were happening at Microsoft's site at press time, and MS had also turned loose a Home Server blog (blogs.tech net.com/homeserver) to keep those interested up-to-date on progress. Introduced in January at CES by *the* man himself, Home Server aims to "help families with multiple PCs connect their home computers, digital devices, and printers, in order to easily store, protect, and share their treasured photos, music, videos, and documents." HP already has MediaSmart Server hardware in the works, with a release planned for late 2007. ▲

Netscape 9 Is Coming

Yes, there are still enough Netscape junkies out there to warrant a new standalone version of the iconic browser. In fact, AOL has brought aboard new developers to work on the cross-platform navigator expected to release in simultaneous Windows, Linux, and Mac OS X versions. Reports are that developers are basing NS9 on Firefox 2.0 code, but it will lack a mail client or Web page editor. If you're asking yourself why bother if you're already using Firefox, in addition to Live Bookmarks support and tight integration with Netscape.com, Chris Finke writes at blog.netscape.com that NS9 will also be the first browser to automatically correct common typos users enter in the location bar. ▲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January 24th 2007

Netscape 9.0 Teaser

Posted by Chris Finke

› tags: browser, netscape

What you are looking at is a draft of the main toolbar of Netscape 9.0, running on Windows XP.

Netscape 9 will be a standalone browser, and from this screenshot, you can infer several things: unlike Netscape 8, Netscape 9 will contain more standardized support for newsfeeds (a.k.a. Live Bookmarks); it will also have tight integration with the Netscape.com service, as evidenced by the icons for the two available Netscape.com extensions (Friends' Activity Sidebar and the Sitemail Notifier). Several Netscape.com-based extensions will be built into the browser; only these two have been previously announced.

I'll be posting a new announcement, feature teaser, or progress report right here each Tuesday, so stay tuned.

related links ›

Comments

(Page 1)

Thomas 2:29PM

Will this one be Mac friendly?

What is Netscape?

Netscape is both a "social news" site and a browser.

The Netscape portal has evolved from a portal that is programmed by us to a portal that is programmed by you — the audience! All of the stories on Netscape are submitted and voted on by users. The more votes and comments a story receives, the higher it is ranked in the list of Top Stories.

Netscape was also one of the first browsers, whose code is the foundation of the Firefox browser. Download the newest version of the Netscape Browser, version 8.1.2 today!

FAQ

Is Netscape.com membership free? Yes.

Is Netscape.com a complete free for all? We have a team of eight full-time "Netscape Anchors" in our newsroom that monitor the site 24 hours a day, 365 days a year.

And I can upload video, too? Yes. See our Video FAQ for details.

See more questions and answers in our FAQ.

Most Commented On (60 days)

Netscape 9.0 Teaser (42)

Tweaking our site mail features (37)

To DTD or not to DTD (26)

BIOS Upgrades Available Online

Compiled by Steve Smith

Before you send another motherboard to the landfill, consider upgrading the BIOS and giving your PC a new lease on life. Here are a few recently released upgrades. Readers can check out www.cpumag.com/cpumar07/bios to see our entire upgrade list.

Motherboard	Date Available	URL
ASRock ALiveNF6G-DVI	2/1/2007	ftp://download.asrock.com/bios/AM2/ALiveNF6G-DVI(1.80).zip
Asus M2R32-MVP	1/26/2007	dlsvr03.asus.com/pub/ASUS/mb/socketAM2/m2r32-mvp/M2R32804.zip
Asus P5B-E	1/31/2007	dlsvr03.asus.com/pub/ASUS/mb/socket775/P5B-E/P5BE1002.zip
BFG nForce 680i SLI	1/15/2007	www.bfgtech.com/nForce680i_motherboard.html
ECS P-4M800PRO-M2	1/22/2007	www.ecs.com.tw/ECSWebSite/Downloads/DownloadFile.aspx?catid=1&driverid=3195&areaid=2&LanID=9
Gigabyte GA-M55plus-S3G (rev. 1.x)	1/30/2007	america.giga-byte.com/FileList/BIOS/motherboard_bios_ga-m55plus-s3g_f9.exe
Shuttle M2000	12/10/2006	ftp://ftp.shuttle.com/BIOS/m2000/3057ss1z.bin
Tyan Thunder h2000M	1/4/2007	www.tyan.com/support_download_bios.aspx?model=S.S3992

The Job Search

You have most likely heard about big music and film companies breaking down the doors of DVD pirates and sending cease-and-desist orders to everyday downloaders; well, it is an ugly job, but someone—maybe you— has to do it. The Walt Disney Company needs a Director of AntiPiracy Investigations, with a back- ground in computer science or IT, who must understand the media post-production process and have experience in computer forensics. If you qualify, you will be Mickey Mouse's top cop in the fight against illegal copying of Disney TV and film properties— this is like "CSI" with a dig ital twist. As the Director of AntiPiracy Investigations, you will do forensic analysis on contraband media to determine its source of physical or digital distribution. And what media exactly will you be protecting from these pesky DVD pirates? Well, one of Disney's biggest hits is the "Pirates of the Caribbean" series.

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Percentage of sports fans who bought an HDTV specifically to watch the Super Bowl

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Nielsen//NetRatings

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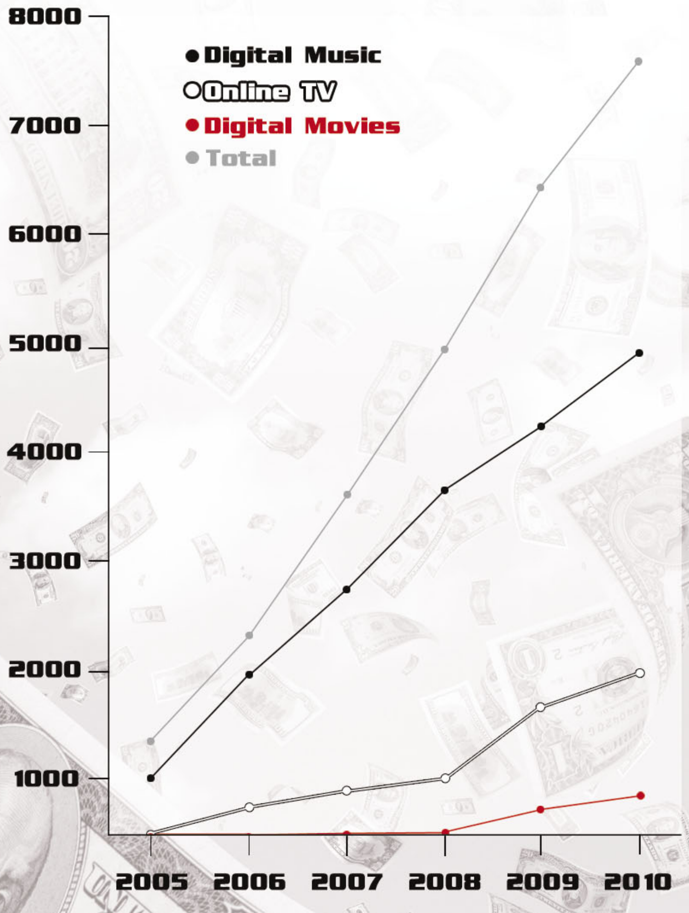
Percentage of adult content digital movies downloaded from P2P sites

NPD

Digital Music, TV & Movie Content Spending In The United States (in millions)

Spending on downloadable digital entertainment this year will be more than three times higher than in 2005 and will double again by the end of 2010, says eMarketer.



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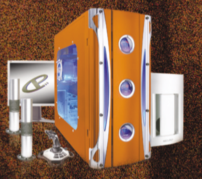

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Korean MMOGs

by Alex St. John

The world of video games is changing rapidly as new, innovative business models for selling gameplay evolve on the Internet. One of the great things about the openness of the PC game market is that it is a primordial soup of creativity and innovation that does not exist in the highly controlled console world. One of the most interesting emergent gaming trends is what I call Korean Model games, named obviously for their roots in Korea, where they have blossomed into a multibillion-dollar business.

Korean Model games are MMOGs that are distributed electronically, are often initially free to play, but may ultimately monetize their audiences through a combination of subscription, advertising, and microcurrency transactions for virtual goods. Korean Model games evolved in Korea and expanded rapidly into China, in part because traditional boxed retail and console game models failed due to extreme piracy. In markets where piracy is rampant, the game client itself has no value and all of a game's value is bound to its community, which is much harder for pirates to steal. Business models based on selling boxes and large bodies of high production value art don't work in these countries. The result is games that are formulated very differently from the fare we consume here in the west.

Many people in the game industry believe that Korean Model games will ultimately be hugely successful here as they are in Asia. There have already been several interesting and striking examples of online games that more closely match the Korean Model performing extremely well here. Jagex, a UK-based MMOG developer, operates a pure Java 3D MMOG called RuneScape that has over 10.2 million players and nearly 1 million monthly subscribers. RuneScape has more online players than even the mighty WoW in the United States. You can play RuneScape directly from a Web page and only need to stream 1MB of data to get up and running. Only players who have invested many hours of play in their characters' development are offered the opportunity to subscribe for $5 per month to access to the premium worlds and quests. Three Rings Design's Puzzle Pirates is another pure Java MMOG with millions of players. It combines subscription with in-game microcurrency to monetize its audience.

Although these Korean Model games are enjoying great success in the United States, they would hardly knock the socks off a hardcore PC gamer with their graphics production values. To that end, many game publishers are trying to westernize MMOGs developed in Korea and bring them here. The challenges in doing this successfully, however, are formidable. Broadband access enjoys much higher penetration rates among consumers in Korea than in the United States, and residential broadband connections have much higher bandwidth. Korean MMOGs are much larger and therefore more difficult to deliver electronically. A 650MB game download may not sound large to a hardcore gamer, but statistics show that on average more than 70% of people who initiate a download of this size will abandon it prior to completion.

Another obstacle in the U.S. is our primitive ecommerce infrastructure. In Korea, consumers can charge online purchases to their broadband or cell phone bills. Here in the U.S. it's extremely painful to get consumers to complete a credit card transaction. On average, over 50% of consumers who initiate an online credit card purchase give up before completing it. Gamers under 17 don't have credit cards and must persuade their parents to complete online purchases for them.

These major differences in infrastructure make the introduction of Korean MMOGs directly from Korea challenging, but there is perhaps a much more difficult obstacle to overcome. Asian tastes in game design are radically different from Western preferences. Many of the Korean Model games place emphasis on gameplay mechanics and storylines that we would find tedious or confusing.

I think Korean Model games will ultimately be very successful in the U.S., but they will not come from Korea and they will rely much more heavily on advertising and subscription fees. For the foreseeable future, giant high production value MMOGs like WoW will maintain a strong dependence on physical retail distribution. ▲

Alex St. John was one of the founding creators of Microsoft's DirectX technology. He is the subject of the book "Renegades Of The Empire" about the creation of DirectX and Chromeffects, an early effort by Microsoft to create a multimedia browser. Today Alex is President and CEO of WildTangent Inc., a technology company devoted to delivering CD-ROM quality entertainment content over the Web.

. . . many game publishers are trying to westernize MMOGs developed in Korea and bring them here.

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by Marty Sems

Polycom RealPresence Experience High Definition 428M

Should Peter Jackson finally wind up directing a film adaptation of "The Hobbit," which is hotly anticipated by even microbes in Antarctica, he'll probably have a few of these installed first. The filmmaker with the mithril touch pushed the envelope of videoconferencing during production of "Lord Of The Rings" to keep his crews in London and California in touch with Middle Earth (erm, New Zealand). Polycom's new H.323-compliant RPX HD 428M (www.polycom.com/rpx) uses four cameras, a 16-foot projection screen, and 3,840 x 720 x 30fps video to give 28 people per side a face-to-face meeting. Pop-up terminals allow file transfers and collaborations over the link. Pricing starts at $299,000, but alternative financing with Silmarils can be arranged.

Continuum Audio Laboratories Caliburn-Cobra-Castellon

Audiophiles are a breed apart. The "High Fidelity" subspecies is devoted to coaxing the utmost in analog sound from vinyl records. Unlike the record store hipsters in that fine film, however, only a select few are able to afford the ultimate means to do so. This turntable system features more engineering, innovation, and exotic materials than NASA typically devotes to a new space exploration platform. We've some amateur background in technology, metallurgy, and audio, but we don't pretend to understand any of it. Each system is built to order by Melbourne's Continuum Audio Laboratories (www.continuumaudiolabs.com) for $99,500, which includes expert onsite setup. Oh, and American distributor Signals SuperFi (www.signals-superfi.com) highly recommends a second tonearm ($15,000) for mono records.

Sharp 108-inch Aquos LCD

The bragging rights are all Sharp's (www.sharpusa.com) this spring. The company had the biggest LCD HDTV at CES, for what it's worth. In a twist, the 108-inch Aquos prototype was even larger than the biggest plasma available. (That "108V" in the photo isn't a model number, by the way.) Another twist: Sharp reportedly intends to start selling these 1080p slabs this summer. And the 108-incher is merely the vanguard of new achievements by the company. In the echelons behind it are models with a 4,096 x 2,160 resolution, a 1,000,000:1 contrast ratio, a 120Hz refresh rate, and/or a 4ms response time. Other HDTV competitors can claim some of those, too, but that big Aquos casts a long, long shadow. ▲

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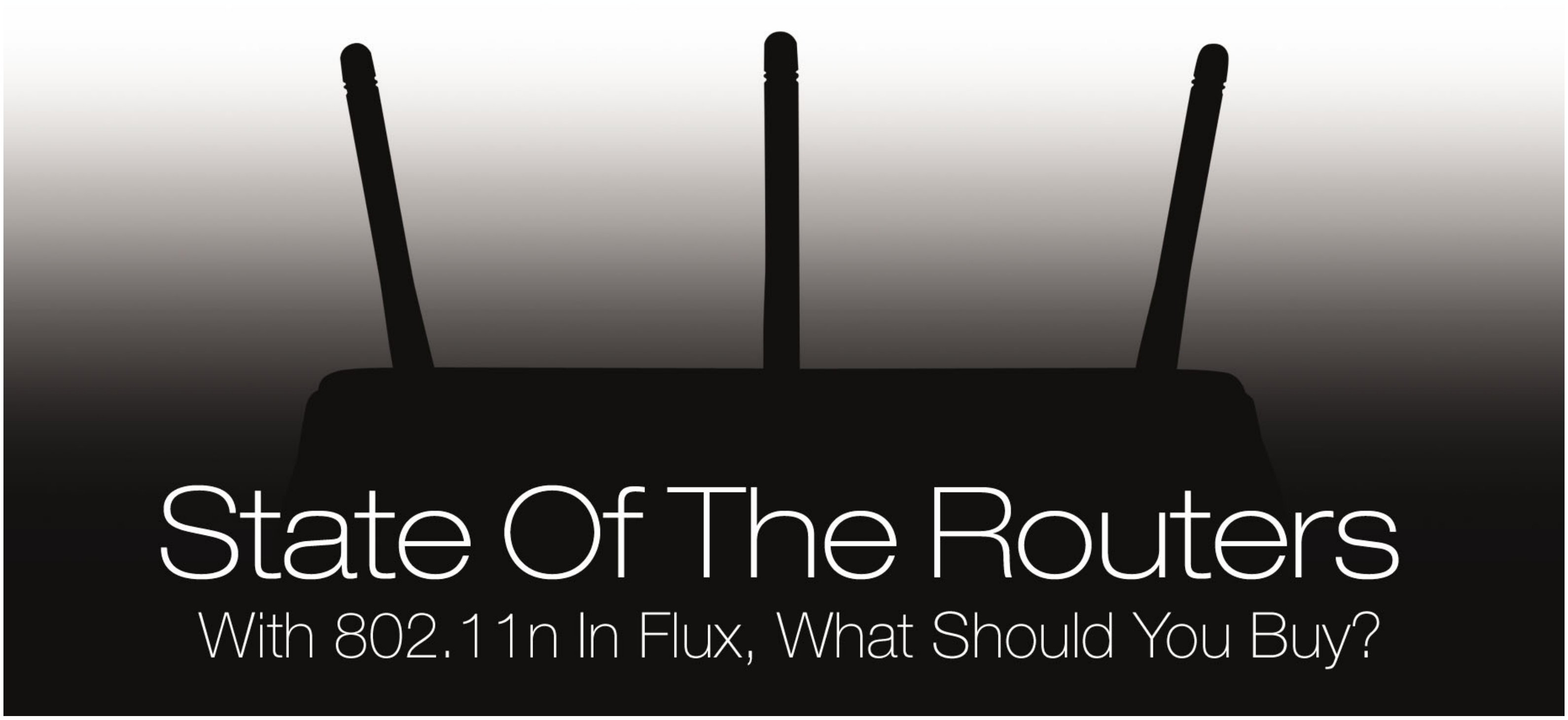


State Of The Routers

With 802.11n In Flux, What Should You Buy?

A cloud of uncertainty has been hanging over the world of wireless routers. The emerging 802.11n standard was to revolutionize wireless networking, offering transfers approaching 300Mbps and offering tremendous increases in range. However, most reviews of the so-called draft-n routers (categorized because they are designed to meet an early, preapproval version of the 802.11n standard) have been negative, as tests of the early products didn't come close to meeting the expectations of the technology. (See "The Draft-N Debacle" on page 16 in the November 2006 issue of *CPU*.)

So, the question for users becomes: What do we do now? Knowing that the 802.11n standard is near completion and that new draft-n products are coming out in the interim, what are the best options for wireless when you don't want to stay on plain 802.11g and don't want to wait for the finalization of the standard?

To answer these questions, I looked five routers—two of the latest draft-n class routers, as well as three routers using the 802.11g standard with MIMO. The routers that I tested came from many of the best names in the industry: Linksys, D-Link, Netgear, Belkin, and Buffalo. This isn't a typical apples-to-apples comparison but is designed to give you some idea of the products available, their price ranges, and some of the features that you can look for in new routers.

How I Tested

To test each router's speed, I attempted to replicate the typical usage of wireless routers in the contemporary home. I conducted the test in a two-story residential dwelling, with the router located on a wooden desk. I placed each router in exactly the same position, with the antennae of each arranged in optimal configuration according to the users manuals of each. To best replicate the heterogeneous environment of the modern digital home, I left all the routers in "mixed" mode, as this default setting is the most likely to be used in homes that have a variety of wireless devices. All the routers had automatic settings that picked the best channel, so I allowed the routers to choose their own channels. I kept all other settings at default levels. The emphasis is not on a best-case scenario, producing results that you'll never see at home, but rather I focused on how real users employ routers.

To gauge the effective range and speed of the routers, I ran three sets of tests in which I sent data across the router's wireless network. I conducted the first test in the same room, 9 feet away. The second set was the most trying, as it was in a downstairs room at an angle, so the signal had to run through three walls, as well as the floor, at an angle, and at a distance of about 55 feet. I conducted the third test from 20 feet away, the signal going through a single floor at a slight angle.

To gauge security features, I compared the features of the various routers, including the security standards employed, firewall features included, and the security features present (access controls, MAC address filtering, etc.). I judged the administrative user interfaces by the features they offered, their design and user-friendliness, and the speed at which they executed changes and rebooted.

For each router, I used the corresponding notebook PC Card from that manufacturer. I created a set of test files, consisting of data files, multimedia files, and executables and copied these files from a custom-built PC (running Windows XP, equipped with an AMD Athlon 64 3200+ processor, 1GB of RAM, and gigabit Ethernet) to an Acer laptop with 1GB RAM, running Windows XP with a Turion 64 Mobile processor. I used pmaSoft's OnlineEye to sample the transfer rates every half-second. I ran all five routers through these tests, plus a class-g router from the previous generation to act as a control. This way, I could see which routers offered improvement over routers of previous generations, even if they didn't offer the theoretical speeds that the marketing materials claimed.

A word of caution in interpreting these findings: I took many reasonable steps to ensure a level playing field for these tests, and these findings may play a significant role in your selection process. But, please keep in mind that there are many variables in home construction, as well as in immediate environmental conditions, including interference from other wireless devices. So, depending on your environment and how you configure your router, your results may vary—for better or worse.

I've ranked the routers relative to each other, taking into consideration setup, administrative user interface, performance, features, and design and weighted these results so that features and transfer results count twice as much as the other elements.

Buffalo Wireless A&G MIMO Performance Broadband Router & Access Point (WHR-HP-AG108): $99.99
With Buffalo Wireless A&G MIMO Performance (WLI-CB-AG108HP): $79.99
www.buffalotech.com
●●◖

Buffalo Wireless A&G MIMO Performance Broadband Router & Access Point

Slim and compact, the Buffalo Wireless A&G Performance Broadband Router & Access Point had the most unusual look of the five routers, with its single antenna sticking up out of its otherwise unobtrusive body. Its appearance doesn't make much of an impression—it's not particularly attractive, but it's so slim that I could imagine how one could hide it somewhere in a home office.

The setup experience for the Buffalo router was the best of the lot. It was very smooth, although its UI wasn't very polished. The Buffalo router's package contents included a slim plug for the power cord and an extra-long patch cable to connect the router to the modem.

I also liked the AOSS (AirStation One-Touch Secure System), a feature that allows you to automatically configure a connection to a wireless client. You simply put the router into AOSS mode by pressing the button on top of the router for a few seconds and then activate the AOSS feature on a compatible card. This establishes a secure wireless connection using the best available security that the card and the router mutually support.

The administration interface was another story. Although most routers can save their settings and reboot in seconds, the Buffalo router took significantly longer—often taking minutes to save my changes and reboot. The UI also limits the administrator's password to eight characters, which I found to be bizarre. (Because this limit was undocumented and was enforced without warning , the router effectively truncated my passwords, and I found myself locked out of the router pending a hardware reset.)

Although the Buffalo router did offer some improvement over the g-class router, it consistently offered the lowest speed of all the routers that I examined.

Added to that, the Buffalo router doesn't include support for either WPA2 or VPN, nor does it include support for the other features (such as access controls, email notifications) that are relatively standard on the rest of these routers. I found a lot to like in the Buffalo router, but it clearly needs a bit of polish.

D-Link Xtreme N Gigabit Router

Housed in an attractive white case, the D-Link Xtreme N Gigabit Router offers numerous features and substantial performance benefits over my 802.11g control router. The design of the D-Link router is sharp but somewhat unassuming.

I liked the setup routine for the most part. The setup was probably the most elegant and inviting that I saw, and I liked that it asked me if I was upgrading as opposed to installing into an environment where there had not previously been a router. However, the router lost points when the setup process stalled when the wizard could not recognize the router—strange, as the setup CD came in the same box with that

D-Link Xtreme N Gigabit Router (DIR-655): $179.99
With D-Link Xtreme N Notebook Adapter (DWA-652): $119.99
www.dlink.com
●●●●◖

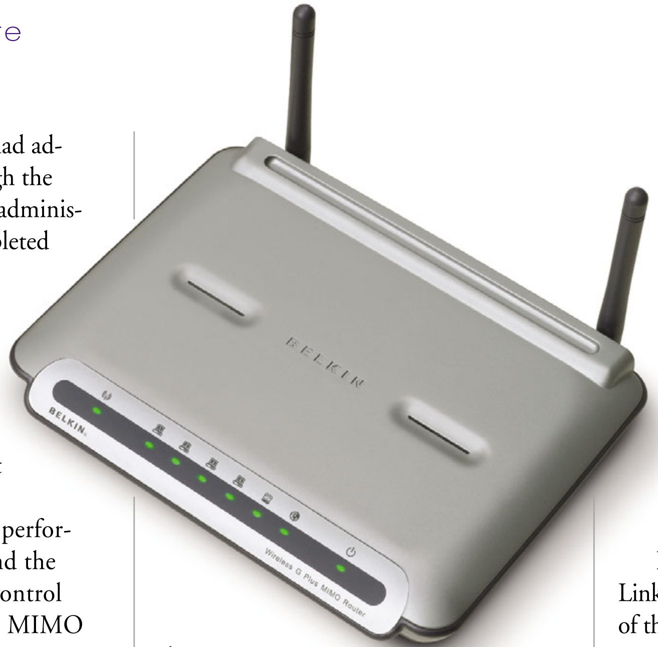
CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

router. In any case, because I had advanced most of the way through the setup, I went directly into the administrative user interface and completed the setup fairly easily.

Using the administrative UI is probably the best way to go anyway, because the UI is not only very sharp-looking but also the fastest that I've seen. I liked the client utility, as well.

The D-Link scored decent performance results, finishing behind the Linksys but far ahead of the control router and outperforming the MIMO routers in general. Its performance compared to the Netgear router was a little closer than I expected, but this was not a totally surprising result. Like the Linksys router, the Xtreme N Gigabit Router offers Gigabit Ethernet connections as well as a USB port.

In terms of overall score, the D-Link was the top router. It's loaded with nice features, including the USB connection and the Quality of Service technology that you should expect in draft-n routers, as well as other useful features and good security. As the second most expensive router-card combination, the D-Link didn't win a single category on its own, but it did well enough in each category in turn that it gets the highest score. It's a good choice for those who can't wait to go to draft-n.



Belkin Wireless G Plus MIMO Router (F5D9230-4): $79.99
With Wireless G Plus MIMO Notebook Card (F5D9010): $59.99
www.belkin.com
●●●●

Belkin Wireless G Plus MIMO Router

The Belkin Wireless G Plus MIMO Router is the most staid-looking router of this bunch. In fact, it looks more like an old-fashioned external modem than a router—if not for the antennas, you might confuse it for something else. The Belkin was the only router I examined that used an extra-wide outlet plug. Every other router has upgraded to a thin plug or to an external adapter. Its appearance is probably fitting, as the Belkin is workmanlike in almost every sense.

I set up the Belkin router without any problems, but the setup wizard focuses only on users who are setting up their first wireless routers and doesn't consider those migrating from a previous router. The Belkin notebook card was another story. It didn't install correctly the first time, and at one point the card's utility crashed my notebook. However, on the second time through the installation, all seemed to work well. Even with issues of stability aside, the card utility was not very impressive.

While the Belkin router offered good security and VPN functionality, it didn't offer as much in the way of features as the D-Link or the Linksys. The Administrative user interface looks plain but is reasonably responsive and well-organized.

The Wireless G Plus MIMO Router performed well enough, offering significant improvement over the class-g control router, but the throughput tended to vary substantially.

Overall, the Belkin executed the tests reasonably well and stood squarely in the middle of the pack of performance for the MIMO routers.

The Belkin is solid—nothing here will wow you, and its list of features will not blow you away. But the Belkin router-card combination was by far the cheapest of this bunch and is clearly the best value, particularly if you don't need or want the frills of the other routers.

Linksys Wireless-N Gigabit Router

Looking more like a futuristic toy than a router, the Linksys Wireless-N Gigabit Router with Storage Link was the fastest router that I looked at. The router itself is attractive enough, with its blue and black accents, and I eventually got used to the paddle-like antenna in the middle of the antenna array.

I had some problems setting up the Linksys router. As was the case with several of the routers, the setup wizard was smooth enough, up to a point, but the wizard crashed about halfway through without any suggestion as to why. I started over and quickly made it back to the point where the wizard crashed. I never did get the client utility running on my laptop, even after following the instructions exactly several times, with restarts in between. I didn't miss the client utility all that much, so I conducted my tests without it.

Linksys Wireless-N Gigabit Router with Storage Link (WRT350N): $199.99
With Linksys Wireless-N Notebook Adapter (WPC300N): $119.99
www.linksys.com
●●●●

> The 802.11n standard has a ways to go yet,
> but I found the results of our testing to be encouraging, if not cause for celebration.

The administrative user interface is pretty well-organized if not beautiful. I liked the responsiveness of the UI, as it saved settings quickly and allowed me to move between screens quickly.

The Linksys was the best-performing router of the lot, turning in the best times in each of my tests. Of course, it's also the most expensive router-card combination of this test, so it probably should perform the best.

Like the D-Link, the Linksys router offers Gigabit Ethernet connections, so its $200 price quickly becomes more attractive when you take that into consideration.

The Linksys offers most of the key features that I looked for, as shown in the chart, but it also threw in management tools for storage that were unique in this group. The Linksys is the best combination of performance and functionality. If you're not averse to spending a little extra cash, this router is the best choice out of this lot.

Netgear RangeMax Wireless Router

I wanted to check out the Netgear RangeMax Wireless Router because it has the single most unusual feature of any of the MIMO routers I looked at—no antennas. At least, the RangeMax doesn't have any external antennas. All the antennas are packed away neatly inside the router's case. The Netgear case is a white box with a ring of blue LED lights on top that flash in a circle when the router is in use. (You can turn the LEDs off using a button on the back of the router—probably a good idea if you plan to place the router in a bedroom.)

The setup for the RangeMax was the second smoothest of any of these routers, ranking just after the Buffalo router. The setup wizard is extremely well-designed, as it used separate instruction trees for replacing a router and for installing a new router.

Netgear products incorporate outstanding user interfaces. The RangeMax router has an excellent admin interface, while the client utility for the notebook adapter was my favorite by a considerable margin. Not only was the utility's user interface attractive, but the profile manager is excellent, as are the included status utilities.

The Netgear router's test results were eye-opening. Although it trailed the Linksys draft-n router in all respects, it finished ahead of the D-Link router in the stressful second test. The gaps were reasonably small in all of the tests, so the RangeMax clearly is the performance-value champion of my testing, as the full investment (including router and one card) would be about $200 compared to $300 or so for the draft-n routers.

Netgear RangeMax
Wireless Router (WPN824): $99.99
With Netgear RangeMax Wireless PC Card
(WPN511): $99.99
www.netgear.com
●●●●

The RangeMax does well on security, but it's missing a few important features that the draft-n routers have, particularly Quality of Service and a USB port for directly attaching devices.

Even if it were not so pretty, the RangeMax would be one of my favorites based simply on its performance. For those of you looking for a MIMO router to hold you over until 802.11n is finalized, consider checking out the RangeMax, or the RangeMax 240 line, which will cost a little bit more but claims even better performance. Overall, though, the attractive little RangeMax is a winner.

Overall Performance vs. Value

The 802.11n standard has a ways to go yet, but I found the results of my testing to be encouraging, if not cause for celebration. If you already have a MIMO or a draft-n router, you should consider sitting tight until the standard is finalized. If you currently use a g-class router, this group of routers certainly offers some worthy choices.

I was hard-pressed to pick an absolute favorite, so consider these options: The D-Link and the Linksys routers are good enough to offer significant improvement over 802.11g—and they offer a bevy of cool features for the power-hungry. The D-Link probably offers the best overall functionality, while the Linksys is the fastest and offers the best connected storage tools. If you're looking for the best speed-value combo, then the Netgear RangeMax is the right play. The Belkin is a great value, and I would recommend it as an interim step to those wary of making a $300-plus investment in a new router and card (or cards) that may not work when the standard is ratified.

Or, you can wait until 802.11n is finalized. But if we always waited until the next standard came out, then we would never upgrade, would we? (*NOTE: Subscribers can go to www.cpumag.com/cpuapr07/routers for bonus performance charts.*) ▲

by Shawn Mummert

These two tests show the relative performance of each router. All times are in minutes: seconds. Be sure to check out the included security features for each router, as well.

Name	**Netgear RangeMax Wireless Router**	**Belkin Wireless G Plus MIMO Router**	**Linksys Wireless-N Gigabit Router with Storage Link**	**D-Link Xtreme N Gigabit Router**	**Buffalo Wireless A&G Performance Broadband Router & Access Point**	**Control**
Model	WN824	F5D9230-4	WRT350N	DIR-655	WHR-HP-AG108	
Price	$99.99	$79.99	$199.99	$179.99	$99.99	
Type	IEEE 802.11g with MIMO	IEEE 802.11g with MIMO	IEEE draft-802.11n	IEEE draft-802.11n	IEEE 802.11g with MIMO	
Design						
Colors	White with blue and green lights	Silver, black	Black, silver, blue	White, black	Silver, black	
Dimensions (HxWxD)	8.8 x 6 x 1.2 inches	6.8 x 1.5 x 7.1 inches	7.40 x 1.57 x 6.93 inches	4.6 x 7.6 x 1.2 inches	1.1 x 5.1 x 5.7 inches	
Antennas	7 internal	2 external	3 external	3 external	1 external	
Removable antennas	n/a	N	N	Y	Y	
LAN ports (not counting Internet port)	4	4	4	4	4	
Wired LAN speeds	10/100 Mbps	10/100 Mbps	10/100/1000 Mbps	10/100/1000 Mbps	10/100 Mbps	
Setup						
Wizard	Y	Y	Y	Y	Y	
Features						
QoS	N	N	Y	Y	N	
USB port	N	N	Y	Y	N	
Warranty	one-year limited	lifetime	three-year limited	one-year limited	two-year limited	
UPnP	Y	Y	Y	Y	Y	
Admin UI	Y	Y	Y	Y	Y	
Parental/Access controls	with optional included software	Y	Y	Y	N	
Email notification	Y	N	N	Y	N	
Advanced blocking	Y	N	Y	Y	N	
Security						
NAT	Y	Y	Y	Y	Y	
Stateful Packet Inspection	Y	Y	Y	Y	Y	
WEP	Y	Y	Y	Y	Y	
WPA2	Y	Y	Y	Y	N	
WPA	Y	Y	Y	Y	Y	
Physical security configuration	N	N	N	N	Y	
DMZ configuration	Y	Y	Y	Y	Y	
MAC address authentication	Y	Y	Y	Y	Y	
VPN IPSEC	Y	Y	Y	Y	N	
L2TP	Y	N	Y	N	N	
PPTP	Y	Y	Y	Y	N	
Performance						
Test 1						
Average time	1:49	2:20	1:30	1:38	2:43	3:34
Throughput in Mbps	23.22	18.08	28.13	25.83	15.53	11.83
Improvement over control	49.30%	34.68%	57.85%	54.12%	24.11%	N/A
Maximum measured throughput	35.7	35.8	53.9	56.8	45.8	
Test 2						
Average time	2:45	3:43	2:44	3:27	5:33	4:52
Throughput in Mbps	15.34	11.35	15.44	12.23	7.60	8.67
Improvement over control	43.43%	23.43%	43.77%	28.91%	-14.29%	N/A
Maximum measured throughput	26.9	31.0	37.1	32.0	22.5	
Test 3						
Average time	2:05	2:21	1:22	1:39	3:18	3:34
Throughput in Mbps	20.25	17.95	30.87	25.57	12.78	11.83
Improvement over control	41.74%	33.96%	61.53%	53.74%	7.63%	N/A
Maximum measured throughput	35.3	37.3	55.4	63.8	34.8	
Summary						Weighting
Features	4	3	5	5	2	2
Performance	4	3	5	4	2	2
Setup	4	2	2	3	5	1
Design	5	3	3	4	3	1
Admin UI	4	4	4	5	1	1
Total score	**4.14**	**3.00**	**4.14**	**4.29**	**2.43**	**7**

CPU RANKING ○ **0 = ABSOLUTELY WORTHLESS** | ●●◖ **2.5 = ABSOLUTELY AVERAGE** | ●●●●● **5 = ABSOLUTELY PERFECT**

Black Holes In Your Pocket

A Portable Hard Drive Septuplet

Disaster recovery in the palm of your hand. A traveling video library. All the presentations, collaboration, and communications vital to your life and livelihood. Sure, you can carry data around on your iPod, but shouldn't you use that expensive storage space for music instead?

It was time once again to gather some portable hard drives and make them fight. I saw some new faces, as well as a couple that have been hanging around for a while.

Because 3.5-inch hard drives are very fragile—not to mention heavy and bulky—the industry generally defines "portable" drives as having 2.5-inch diameter or smaller platters. That encompasses most notebook drives on down to 0.85-inch mobile device form factors, with 1- and 1.8-inch models in between. In order to qualify as really portable, a hard drive should be able to siphon all the power it needs from the bus, whether that means one or two cable connections.

All of the drives I received for this roundup used USB 2.0, which is far and away the most popular way to connect pocket and portable drives to computers. FireWire offers slightly more headroom despite its theoretically inferior burst rate (400Mbps vs. USB's 480Mbps), but its higher price and USB's nigh-universal support in most any recent computer overshadow any performance gains.

So where's the new white knight, eSATA? The eSATA interface is exciting because, unlike USB 2.0, FireWire, or Ethernet, eSATA doesn't impose a performance bottleneck on faster drives. Unfortunately, eSATA hasn't filtered down to 2.5-inch and smaller external hard drives just yet, although some could use the boost. It's clear that some of the 2.5-inch form factor drives are butting up against USB 2.0's 33MBps practical ceiling.

"We are extremely pleased with the performance advantages delivered via [eSATA] for 3.5-inch external solutions," says Brian Pridgeon, a director of marketing for Seagate. "However, in the near term, we must overcome power challenges before we might achieve similar performance results on smaller, mobile form factor portable solutions."

The problem is that users expect pocket and portable drives to be bus-powered. "2.5-inch and smaller portable solutions require more juice than eSATA is capable of delivering," Pridgeon says.

Speaking of Seagate, it was one of the vendors who couldn't participate by the deadline. The 800-pound gorilla of hard drives announced some cool new portables under the FreeAgent name at CES, but it wasn't able to ship us some samples in time for this review. On the other hand, Western Digital sent us two Passport drives, and Teac went above and beyond with three evaluation units.

Finally, pure flash memory devices weren't invited to this party. Of course, there are some 16GB USB flash drives floating around making the smaller hard drives nervous.

How I Tested

You read *CPU*, so it's fair to say that performance matters to you, even in the pocket hard drive realm. Therefore, I ran a number of benchmarks and tests on every drive that crossed my transom. You shouldn't discount the prominence of capacity, cost, physical size, usability, software bundle, nor warranty period just to gain an extra MBps or two when you shop for a new mobile drive, but you certainly don't want to buy a pig, either.

Most portable hard drives come preformatted with at least one partition, and the file system of choice is usually FAT32 for compatibility at the expense of efficiency. I ran two tests on each drive's default configuration (including write caching or the lack thereof) to demonstrate their mad skills out of the box. PCMark05 1.2.0's hard drive tests provided synthetic benchmarks for my stock contestants, and a timed file transfer of a 4GB folder of mixed files of various sizes gave us a real-world performance perspective.

Sure, it may seem a little silly to run something like PCMark's XP Startup test on a pocket drive, but then, this is the age of U3, Migo, and many other types of apps designed to run from a USB drive. Every test offers at least some insight into each drive's ability to handle various types of demands within the limits of the USB interface.

I finished up with two synthetic benchmarks, HD Tach RW 3.0.1.0 and Iometer 2004.07.30. These work best on an unformatted drive, so I deleted each contestant's partition(s) and ran the benchmarks. (WinXP's Disk Management couldn't delete the Teac 1" drives' partitions, so I freshly formatted them with their default FAT32 file system before running HD Tach and Iometer. Also, after I deleted the original partitions, Windows didn't give me the option to format new partitions on the larger drives with FAT32 so that I could run PCMark05 and time folder transfers in Vista. I had to use NTFS.) I ran the Quick Bench and write tests in HD Tach RW 3.0.1.0, along with custom File Server (one worker with 16 outstanding I/Os) and Web Server (four workers with 16 outstanding I/Os each) trials in Iometer 2004.07.30.

My test platform had a 2.6MHz AMD Athlon 64 FX-55, 2GB of RAM, a 74GB Western Digital Raptor WD740GD, and a DFI LANParty NF4 SLI-DR motherboard. I used fully updated installations of Windows Vista Home Premium and XP Pro.

For all tests, I used an integrated USB port on my motherboard. This was an attempt to avoid any skewed results from the higher error rates that can occur on front-mounted ports, owing to interference picked up by the header cables.

Apricorn Aegis Portable 160GB

Although model A25-USB-160 from Apricorn hides its 5.5-inch USB cable in a channel that wraps around two sides of the drive, it's still shorter in length than its 2.5-inch rivals from Teac, Toshiba, and Western Digital in this review. Its rugged enclosure has a neat design, but one problem is a couple of sharp corners around the berth for the cable connector. These make themselves felt when you pick up the unit with the cable extended.

Aegis Portable 160GB
$229
Apricorn
www.apricorn.com
●●●●◖

Disaster recovery, encryption, and synchronization software—compatible with both Win2000/XP PCs and Mac OS X—headline a list of perks I've come to love from Apricorn. There's also free phone tech support, a soft carrying case, and two extension cables. One of these has a supplemental USB port connector in case the data port can't supply enough power to run the drive. Using two USB ports beats a wall wart any day, especially in a mobile application.

With a Hitachi drive inside, the Apricorn wins more than it loses in performance tests against the 120GB Teac and

Rockets For Pockets & USB Sockets

Bare scores are from Windows Vista; WinXP scores are in brackets []. All drives use USB 2.0. Benchmark scores are in MBps except as noted. All drives were tested in their stock configuration, which usually meant write-caching was disabled by default for quick removal. PCMark05 and the folder transfer tests were performed with formatted FAT32 partitions except for the 120GB and larger drives in Vista (NTFS). ▲

	Apricorn Aegis Portable 160GB	Teac Portable 1" 5GB	Teac Portable 1" 8GB	Teac Portable 2.5" 120GB	Toshiba Portable 160GB
Form factor	2.5-inch	1-inch	1-inch	2.5-inch	2.5-inch
Size (HxWxD, inches)	4.7 x 3.3 x 0.8	1.9 x 1.9 x 0.5	1.9 x 1.9 x 0.5	5.3 x 3 x 0.6	5.6 x 3.5 x 0.9
Spindle speed (rpm)	5,400	3,600	3,600	5,400	5,400
Cache (MB)	8	2	2	2	8
Seek time, advertised (ms)	12	34.5	34.5	18	12
Shock tolerance, op/non-op (G)	300/1000	175/750	175/750	N/A	325/850
Warranty (years)	3	1	1	1	1
PCMark05 overall score (points)	2808* [3011]	n/a [n/a]	n/a [n/a]	2401* [2545]	2828* [3040]
XP startup	5.7* [6.3]	n/a [n/a]	n/a [n/a]	5.3* [5.7]	5.8* [6.3]
Application loading	4.7* [5.1]	n/a [n/a]	n/a [n/a]	4* [4.3]	4.5* [5.1]
General usage	3.8* [4.2]	n/a [n/a]	n/a [n/a]	2.9* [3.2]	3.8* [4.1]
Virus scan	24.3* [25.5]	n/a [n/a]	n/a [n/a]	22.7* [22.8]	25* [26.4]
File write	28.6* [29.9]	n/a [n/a]	n/a [n/a]	24* [24.4]	29.5* [30.6]
Folder transfers (min:sec)					
4GB read	7:10* [7:20]	n/a [14:55]	14:25 [12:47]	7:36* [6:56]	7:06* [6:47]
4GB write	9:11* [10:05]	failed [2:51:50]***	45:36 [41:46]	8:52* [10:41]	7:26* [9:20]
HD Tach RW					
Read rates, avg/max	31.6/32.5 [31.4/33]	failed [6.3/8.1**]	failed [7.6/9.8**]	29.9/33[29.5/32.5]	30.4/33 [26.8/31]
Write rates, avg/max	31.9/33[31.7/33]	failed [6.2/8**]	failed [7.5/9.9**]	27.5/29[26.1/28]	30.1/33 [29.9/33]
Random access (ms)	17.2 [17.2]	failed [27.3**]	failed [30.5**]	17.7 [17.8]	17.2 [17.2]
Burst rate	32.8 [32.9]	failed [22.8**]	failed [10.9**]	33.3 [33]	33 [33.9]
CPU Utilization (%, +/- 2%)	15 [7]	failed [0**]	failed [2**]	13 [5]	8 [4]
Iometer					
File server (IOps)	66.03 [70.51]	38.54 [40.45**]	35.35 [38.89**]	73.58 [79.74]	76.28 [82.38]
Web server (IOps)	90.77 [92.13]	50.79 [51.52**]	57.80 [59.30**]	87.02 [88.16]	91.25 [92.03]
CPU rating	●●●●◖	●◖	●●	●●●	●●●●◖

*NTFS.
**Partitioned, FAT32.
***(hr:min:sec)

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

160GB Western Digital and almost catches up to the Toshiba. It had the best average write and read rates in the synthetic HD Tach RW benchmark, but this didn't materialize into an advantage in my real-world folder transfers.

This Aegis looks pretty good next to the 120GB Teac on price and capacity, but its $229 price (at the time of this writing) can't touch the sub-$200 Toshiba, let alone the $179.99 WD. Still, it stands alone with the longest warranty by far.

Teac Portable 1" Hard Drive 5GB

In the great PowerPoint of life, economy is this aging pocket drive's bullet point. It comes with a short extension cable, a vinyl belt loop case, and drivers for Win98SE. Mac OS X supports it, as do WinMe/2000/XP/Vista.

Western Digital Passport Pocket 6GB	Western Digital Passport Portable 160GB
1-inch	2.5-inch
2.4 x 1.8 x 0.4	5.1 x 3.1 x 0.6
3,600	5,400
n/a	8
11	12
150 / N/A	30 / N/A
1	1
707 [728]	2668* [2895]
1.9 [1.9]	5.5* [5.8]
1.3 [1.4]	4.4* [4.9]
1 [1]	3.6* [4]
5.2 [5.6]	22.4* [24.7]
5.5 [5.6]	28.4* [29.4]
20:19 [17:15]	7:04* [5:55]
38:11 [32:38]	8:04* [10:18]
6.2/7.9 [6.1/7.9]	30.9/33 [29.4/31]
6.3/7.9 [6.3/7.9]	27.3/31.5 [27/32]
23.6 [23.7]	17.5 [17.6]
9.7 [9.9]	33 [33.9]
2 [2]	11 [5]
42.69 [43.96]	76.00 [82.78]
47.26 [47.86]	86.73 [87.17]
●●●	●●●●

Portable 1" Hard Drive 5GB
$79
Teac
www.teac.com/dspd
●◖

Portable 1" Hard Drive 8GB
$112
Teac
www.teac.com/dspd
●●

Trying to copy more than a few files at a time to this economical veteran is like a long flight to Australia in which the only movie onboard—set on repeat play—is "Mannequin." Ponderous. Tedious. But with less Kim Cattrall.

One of the two 5GB Portable 1" drives (model HD10U5) Teac sent us didn't work properly, so I included my results from the other unit. PCMark05 didn't recognize any of the Seagate-based 1-inch Teacs as testable drives. Furthermore, Windows didn't let us delete the drives' FAT32 partitions, although I could reformat them to either FAT32 or NTFS.

Teac Portable 1" Hard Drive 8GB

The 8GB edition of the Teac 1" (model HD10U8) is more likable than the 5GB. It's a little faster in most respects and can store a DVD's worth of data without going comatose for a while. It seemed to work a little better than its 5GB little brother, too, although it still didn't play nice with all of my benchmarks, especially in Vista.

Also like the 5GB model, this roomier sibling comes with a cable, case, and miniature driver CD. It wins a few battles with Western Digital's Passport Pocket 6GB but loses a few, too. The WD is thinner, but longer.

Portable 2.5" Hard Disk Drive 120GB
$219
Teac
www.teac.com/dspd
●●●

The Teac doesn't come with sync and encryption software like the WD's Passport Pocket, but it does offer an extra 2GB for 12 more bucks.

Teac Portable 2.5" Hard Disk Drive 120GB

Speed and capacity make a quantum leap once you leave the 1-inch form factor behind. Teac's third entrant (model HD2U-120) uses a Western Digital drive to pack 120GB into a PDA-sized package. It's just small enough to fit in a business shirt pocket, although you won't keep it there for long because of the drive's heft.

The enclosure's rough, black finish hides fingerprints and affords you a good grip. Teac includes a data cable with an extra USB connector for supplemental power. This drive comes with NTI's Backup Now! 4 for Win98/Me/2000/XP, but its more spacious competitors show it up with more software and faster performance.

Want most of the capacity of a 2.5-incher with more pocketability? Teac also offers 1.8-inch mobile drives.

Toshiba USB 2.0 Portable External Hard Drive 160GB

New to the pocket storage market—the retail side of it, anyway—is mini-hard drive powerhouse Toshiba. *CPU* received the first eval unit of the company's new portable drive, so I got right down to testing it.

This drive won most of my performance tests. Its rounded aluminum shell has a matte black finish and a keen, elongated

USB 2.0 Portable External Hard Drive 160GB
N/A
Toshiba
sdd.toshiba.com
●●●●◖

Passport Pocket 6GB
$99.99
Western Digital
www.westerndigital.com
●●●

activity LED. Plastic endcaps protect against bumps, while integral rubber pads isolate vibrations and keep the drive from sliding around. NTI's Shadow backup tool for Win2000/XP and Mac OS X comes standard, and there's a 30-day trial version of NTI Ripper, too.

Like the Teac 120GB, this Toshiba can be bus-powered through a single USB cable in most USB 2.0 ports, but it includes a separate USB-to-DC converter cable for supplemental power if needed. Both cables are surprisingly long for USB at more than 4 feet. (The Toshiba drive actually performed a smidgen faster with one cable than with both.)

Toshiba may lead this pack on performance, but the low price of WD's 160GB Passport Portable and the long warranty of the Apricorn Aegis spoil the victory. Toshiba hasn't announced an official price yet, but its rep claimed it would be under $200.

Western Digital Passport Pocket 6GB

Falling between the tiny Teacs in capacity and price is Western Digital's more polished 6GB Passport Pocket. It looks like a slim Zippo.

WD's model WD60W028 has a USB connector that pivots 90 degrees from the body of the drive. The connector also twists 90 degrees, like a wrist. This neat feature helps the drive fit when you plug it into a USB port that's in a recessed area.

Obviously, there's a Western Digital drive inside the Passport Pocket, and it has fluid dynamic bearings for silence, long life, and cool operation. Inside the blister pack is a single goody: a translucent green, rubbery skin that radically changes the drive's personality (once you finally get it on the drive, that is).

WD Sync synchronization and encryption software comes with the drive, as does a diagnostic tool. The software only works with Windows, but the drive also runs under Mac OS 9.2.2 and later, as well as OS X 10.1.5 and up.

Western Digital Passport Portable 160GB

Seriously undercutting Apricorn and Teac on price (and probably Toshiba, as well) is Western Digital, offering 160GB for $179.99. If looks are anything to judge by, however, you'd swear that the Passport Portable was the most expensive drive here.

Passport Portable 160GB
$179.99
Western Digital
www.westerndigital.com
●●●●

This drive's black shell is half matte and half glossy. (Yes, fingerprints show up on the shiny side.) Its profile is slightly rhomboid with radiuses opposite acute angles on the edges. Really, it's a lot more elegant than this clinical description would suggest. A WD logo is etched into the glossy top panel, and a blue LED ring on one corner illuminates to indicate that the drive is drawing power from the single USB cable. A tethered rubber plug protects the USB port and even blends in nicely with the matte black edge.

Speaking of rubber, four rubber feet give this drive more nonslip grip than you'd expect. And speaking of protection, this pretty (and solid) drive comes with a soft, zippered pouch. There's even a padded pocket out front for the 22-inch extension cable.

WD sells the Passport Portable in 40GB, 60GB, 80GB, 120GB, and 160GB capacities. My drive had a model number of WD1600U017-002, although the manufacturer calls it the WDXMS1600TN. As with the Pocket Portable, you get sync, encryption, and drive diagnostic software for Windows only. Western Digital specifies Win2000/XP and Mac OS X 10.1.5 and up for full compatibility.

My 160GB unit was a hair behind the Toshiba in speed, but its design, low price, and extras more than make up for it.

Mightiest Of The Mites

Toshiba wins the performance crown among the 2.5-inch units dissected here, but look to the 160GB Western Digital for the most bang—and beauty—for the buck. Apple users may find the Apricorn Aegis more attractive with its long warranty and well-rounded software package that doesn't short-change Macheads.

As for 1-inch pocket units—should you feel that it's even worth buying one over a flash memory drive at this stage—I'd recommend the 6GB Western Digital unless you need more capacity. Leaving the software bundle and included sheath aside, it was simply much more reliable than the 1-inch Teacs. ▲

by Marty Sems

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

Netgear XE103 85Mbps Wall-Plugged Ethernet Adapter

Wireless networks for the home and office have become sort of the *de facto* standard for those of without the luxury of Cat 5 cable runs. On the other hand, anyone that has ever used a wireless network within the confines of a multi-level dwelling or office also knows that Wi-Fi networks can be rather unreliable. There are obvious security risks, as well.

Alternatively, Netgear has introduced 85Mbps powerline Ethernet adapters that turn any wall socket into a Fast Ethernet connection. I tested a pair of Netgear's XE103 85Mbps Wall-Plugged Ethernet adapters across my lab's simple Gigabit Ethernet router and network. Installation was as simple as plugging one unit into a wall outlet near the router and connecting a Cat 5 cable from the adapter to the router. At the other end, I plugged another adapter into the wall outlet near my client machine and connected the adapter to my system's Ethernet NIC. I didn't need drivers or other software to install and literally set up both adapters in seconds. These units use copper power lines in your wall to transmit an Ethernet signal while isolating the electronics from the AC current.

The pair of XE103s worked like a charm right out of the box—not something I can say for Wi-Fi in remote corners of the building. My real-world tests showed the XE103s were able to stream 1080p video content without a hiccup. File transfer rates were slightly faster than 802.11g, even when our Wi-Fi setup had excellent signal strength. My Internet download/upload test showed the XE-103-connected client posted 1,696KBps download and 92KBps upload speeds, which provided a more-than-snappy Web experience over my 6Mbps cable connection. Kudos to Netgear for doing powerline networking right. ▲

by Dave Altavilla

XE103
$69.99 (one adapter)
Netgear
www.netgear.com
●●●●

Specs: HomePlug 1.0 compliant; Ports: 1 10/100Mbps Ethernet, 1 85Mbps Powerline, Range: Up to 5,000 square foot home

Qnap Systems TS-201

NAS for the home is starting to feel like a necessity for many folks, as digital photos, music, video, and important document files pile up over time. Years ago, a few floppies or a CD backup did the trick; these days, NAS is the way to go. There are a number of offerings on the market from the likes of Buffalo Tech, Western Digital, and Seagate, but most of these consumer-grade products are single-drive setups and don't come with much in the way of software except for automated backup tools.

Qnap Systems offers something a little different with its line of barebones NAS Turbo Stations. I took the two-drive TS-201 for a spin. This unit lets you install two standard 3.5-inch drives for up to 1.5TB of capacity, with hot-swap and RAID 1 capabilities. Both the TS-201 and its smaller, single-drive sibling, the TS-101, feature a preconfigured Linux-based embedded OS and powerful Web client software.

The unit's Download Station allows BitTorrent via a Web interface that doesn't need a client PC to manage connections. Web-based photo-sharing features and print server connectivity are also included. The enclosure is even bundled with TwonkyVision MediaServer software that lets the unit act as a streaming media device for Internet radio. All together, with the company's Netbak Replicator software, you get a Swiss Army Knife of tools to assist with just about any functionality you'd want from a NAS device like this.

Unfortunately, there was one chink in the TS-201's armor: Netbak Replicator, which doesn't provide options for incremental or differential backups. That's a pretty big hole for those of you automating backups of large volumes and installations. Also, Netbak Replicator doesn't currently have an Ignore option, should a file be in-use or otherwise locked during the backup process. But regardless of these small annoyances, the Qnap TS-201 is definitely an innovative new twist on SOHO NAS. ▲

by Dave Altavilla

TS-201
$359.99
Qnap Systems
www.qnap.com.tw
●●●

Specs: Supports two 3.5-inch SATA HDDs up to 1.5TB; hot-swap capability; Ports: 1 Gigabit Ethernet, 3 USB 2.0; 115 x 175 x 214 mm (HxWxD)

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

BFG Technologies GeForce 8800 GTX OC 768MB Water Cooled Edition

You've probably heard a thing or two about a certain DirectX 10 graphics card that's been breaking benchmark records for the past few months. But while AMD hammers out R600's kinks, BFG, with the help of Danger Den, took Nvidia's flagship GeForce 8800 GTX and bolted on a supercharger.

The GeForce 8800 GTX OC 768MB Water Cooled Edition sheds the stock GTX's enormous, dual-slot heatsink in favor of a custom-fitted, copper and steel water block, sandwiched to the card's GPU, RAM, voltage regulators, and I/O chip with a layer of Arctic Silver. The card includes 1/2-inch, 3/8-inch, and 1/4-inch fittings, clamps, and stems to allow for another card in SLI, plus a lifetime warranty.

Sure, it looks sharp, but BFG also took the opportunity to boost the card's core, shader, and memory clocks to 650MHz, 1.5GHz, and 2GHz, respectively. In my water-cooling rig, it sped past a factory-clocked GeForce 8800 GTX in just about every benchmark. In 3DMark06, BFG's card bested the stock card by 967 points at 2,560 x 1,600. At press time, Microsoft had just released Vista, but I'm still waiting for a major DX10 game to put this card through its paces. ▲

GeForce 8800
GTX OC 768MB
Water Cooled Edition
$899
BFG Technologies
www.bfgtech.com
●●●●◖

by Andrew Leibman

Specs: GeForce 8800 GTX; GPU clock: 650MHz; 768MB GDDR3 memory at 2GHz (effective); 128 stream processors; custom watercooling

Benchmark Numbers
Driver version 6.14.10.9697

		BFG GeForce 8800 GTX	GeForce 8800 GTX OC Water Cooled Edition
3DMark06	1,280 x 1,024	11603	12571
3DMark06 HDR/SM3.0		4691	5370
3DMark06	1,600 x 1,200	10064	11294
3DMark06 HDR/SM3.0		3956	4576
Far Cry 1.33 (4XAA/8XAF)			
Training		178.9	182.6
Research		226	250.4
F.E.A.R. (4XAA/8XAF)*		127	135
Quake 4 (4XAA/8XAF)**		109.5	101.4
Oblivion (4XAA/8XAF/HDR)			
Outdoor		74.7	86.2
Town		80.5	83.3
Dungeon		77.8	82.5
3DMark06	2,560 x 1,600	7096	8063
3DMark06 HDR/SM3.0		2536	2924
Far Cry 1.33 (4XAA/8XAF)			
Training		109	128.7
Research		113.4	142.4
F.E.A.R. (4XAA/8XAF)*		77	85
Quake 4 (4XAA/8XAF)**		89.4	93.7
Oblivion (4XAA/8XAF/HDR)			
Outdoor		40.8	52.9
Town		79.2	79.9
Dungeon		67.6	78.3

*Soft Shadows disabled
**Dual-core CPU support enabled

AMD Athlon 64 X2 6000+

The lines, they are a changin'. With the introduction of the AMD Athlon 64 FX 70, the company is no longer applying the FX moniker to new Socket AM2 processors. Going forward, the FX line will include the dual-core, dual-processor kits known as 4X4, which currently use a Socket 1207 layout.

The Athlon 64 X2 6000+ is the next step in AMD's mainstream line and at 3GHz it's the fastest AM2 processor around. That clock speed puts the 6000+ in front of the 2.8GHz Athlon 64 FX-62, as well. The 6000+ boasts 2MB of L2 cache (1MB per core) and 256KB of L1 cache (128KB per core). As with the FX-62, it supports memory at DDR2-800 speeds.

As with other X2 processors, the X2 6000+ has a locked multiplier. I wasn't able to bump the clock speed particularly high: It topped out at 3.12GHz. The processor's voltage starts at 1.35 to 1.4V, but I found that it couldn't overclock very much without some extra juice. In fact, I wasn't able to reach a stable 3.12GHz without jumping to 1.55V, one step below the top voltage that the Asus M2N32-SLI Deluxe offers.

I used stock cooling to test the X2 6000+ at stock and overclocked settings, so I expect that better cooling systems will yield higher overclocks. Even so, it looks like overclockers aren't going to see a huge jump from the CPU's default settings.

AMD tells me that the X2 6000+ offers better performance in many applications than the FX-62, and I agree. The 6000+ completed my Dr. DivX and WinRAR tests faster than the FX-62 in a nearly identical system. (Only the video cards differed: The X2 6000+'s system boasted a 1GB Evga Nvidia GeForce 7950 GX2, whereas the FX-62 relied on a 512MB Gigabyte Nvidia GeForce 7900 GTX.) The X2 6000+ also bested the 2.66GHz Intel Core 2 Duo E6700 in 3DMark06 (8183 and 8031, respectively) and produced a slightly faster Dr. DivX score, but the Intel processor completed WinRAR 23 seconds faster.

Overall, the X2 6000+ is a pretty solid processor and about $70 less expensive than Intel's E6700. If you're not ready to make the jump away from your socket AM2 motherboard, the X2 6000+ isn't a bad upgrade. (*NOTE: Subscribers can go to www.cpumag.com/cpuapr07/6000 for additional performance data.*)▲

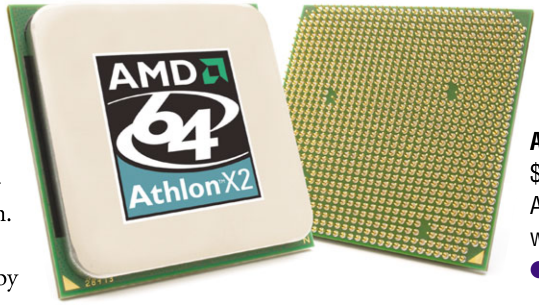
by Joshua Gulick

Athlon 64 X2 6000+
$459 (per 1,000)
AMD
www.amd.com
●●●●

Specs: 3GHz clock speed; 2GHz HyperTransport; Socket AM2; 90nm SOI process; 2MB L2 cache (1MB per core)

CPU RANKING ○ **0 = ABSOLUTELY WORTHLESS** | ●●◖ **2.5 = ABSOLUTELY AVERAGE** | ●●●●● **5 = ABSOLUTELY PERFECT**

AMD Athlon 64 X2 5000+ 65nm



Athlon 64 X2 5000+ 65nm
$222
AMD
www.amd.com
●●●◖

Although enthusiast PC components pull more power with each iteration, many mainstream parts are headed in the opposite direction. AMD, for example, is following in Intel's footsteps by producing energy-efficient processors on the 65nm SOI (silicon-on-insulator) process. AMD sent me a new X2 5000+ 65nm, as well as an older X2 5000+.

The 65nm X2 5000+ is a dual-core, Socket AM2 processor with a 65W max thermal power rating. That's a pretty significant drop from the 90nm processors, which were rated much higher. The brand-new 90nm Athlon 64 X2 6000+, for example, rolled into our labs with a toasty 125W max power rating. The 90nm X2 5000+ isn't quite so power hungry as the X2 6000+, but at 89W, it still can't compete with the efficiency of the new version. Another plus is that by building 65nm CPUs on 300mm wafers, it's increasing the number of CPUs per wafer.

But aside from the SOI process and power consumption, the X2 5000+ is just another AM2 processor. It has a 2GHz HyperTransport, supports memory up to DDR2-800 (PC2-6400) and an integrated 128-bit memory controller. It also has 128KB of L1 cache per core (64KB instruction and 64KB data cache) and 512KB of L2 cache per core. AMD builds the new X2 5000+, along with it the X2 6000+, in Dresden, Germany at its Fab 30 plant.

AMD tells me that the two processors offer comparable performance; the value of the X2 5000+ 65nm lies in its power savings, particularly under load. A power-efficient CPU makes a great companion for a small, power-efficient board that uses integrated graphics, but those of us who aren't willing to toss our gaming-friendly video cards just yet will use this processor with an ATX board and some add-on cards. To that end, I put the processor in our standard test system, with an Asus M2N32-SLI Deluxe motherboard, a 1GB Evga Nvidia GeForce 7950 GX2 PCI Express graphics card, and a 74GB Western Digital Raptor WD740 hard drive.

Sure enough, both 2.6GHz X2 5000+s offered similar scores in 3DMark06. The 90nm version pulled ahead in my F.E.A.R. tests with 60fps to the 65nm version's 54fps, but I submit that a casual gamer won't consider this a deal breaker—at least, not if he's looking to reduce power consumption.

I tested power consumption with Cool'n'Quiet both enabled and disabled. If you're trying to save power, you'll definitely want to take advantage of this feature. It reduces CPU speed when the extra cycles aren't needed. (You'll find that the X2 5000+'s clock speed drops to under 1GHz when the system is idle.) The test system pulled less wattage when it used the X2 5000+ 65nm under load. Both systems pulled less power with C'n'Q enabled but generally performed a little slower than they did without the power saving feature.

There's no question that the X2 5000+ offers comparable performance for fewer watts than its more power-hungry cousin. Both versions of the X2 5000+ carry a price tag of $222 (per 1,000 units). In my opinion, the price match ought to seal the deal in favor of the 65nm version for anyone but the gamer who's not willing to give up a few frames (and I'm betting said gamer flipped past this page minutes ago anyway). If you're looking to reduce your main rig's power consumption, the X2 5000+ is a good first step, and if you're building a completely power-friendly rig, this processor is a must. ▲

by Joshua Gulick

Benchmarking Numbers		Time*	Mean Wattage	Time*	Mean Wattage
		(C'n'Q enabled)		(C'n'Q disabled)	
AMD Athlon 64 X2 5000+ 65nm	Idle		162W		181W
	Dr. DivX	7:11	201W	6:15	215W
	WinRAR	4:41	194W	4:22	204W
AMD Athlon 64 X2 5000+ 90nm	Idle		167W		181W
	Dr. DivX	7:20	208W	6:16	222W
	WinRAR	4:18	202W	4:05	211W

*Minutes:Seconds

AMD Athlon 64 X2 5000+ 65nm	Clock Speed	3DMark06	SM2.0	HDR/ SM3.0	CPU	PCMark05	CPU	Memory	Graphics	HDD	F.E.A.R.	F.E.A.R. CPU Test
	2.6GHz	7832	3572	3440	1954	2855*	5291	4016	6972	9*	54fps	66fps
AMD Athlon 64 X2 5000+ 90nm	2.6GHz	7839	3588	3444	1945	6206	5534	4255	7002	6265	60fps	75fps

* PCMark05 failed to provide accurate hard drive scores.

Specs: 2.6GHz clock speed; 2GHz HyperTransport; Socket AM2; 65nm SOI process; 1MB L2 cache (512KB per core)

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

Creative Xmod

You don't have to be an audiophile to listen to digital music and know that something is missing. Some of a CD's richness doesn't quite make it into the digital version when it's converted.

To help restore this lost texture, Creative has introduced the Xmod, a small gadget that plugs between your PC speakers and audio source. An audio processor that reconstructs and restores the lost textures of digital recordings is the heart of the Xmod.

And it works. The tone and the quality of music played through the Xmod just sounds better. With both streams and digital files, the music was both richer and fuller than I expected—almost 3D. The effect was present with either speakers or headphones.

Setup is easy. In the standard configuration, I plugged the Xmod into an audio source and connected it to a USB port (which doubles as power source) and my PC speakers (or headphones). Windows XP immediately recognized the device and required no configuration. However, it would have been nice if the package had included an extra audio cable to connect to a MP3 player.

With a small footprint and stylish exterior, the Xmod's design is elegant. The volume control and mute button are particularly welcome conveniences, and the glowing blue status lights are as functional as they are attractive.

Be aware that the Xmod's power demands limit its portability. Because it needs to draw power from a USB port or the external power adapter, you won't be connecting the Xmod to your iPod and running around town with it.

But for the true digital music lover, the Xmod is must-have hardware. For this price, this attractive and easy-to-use product adds tremendously to the digital music experience. ▲

by Shawn Mummert

Xmod
$79.99
Creative
www.creative.com
●●●●

Specs: X-Fi Crystalizer; X-Fi CMSS-3D; Plug and play

Logitech Alto

Upgrading your notebook generally means discarding your docking station or port replicator and replacing it with a new proprietary stand. Logitech's Alto notebook stand occupies the middle ground: With its USB 2.0 ports, the stand offers connectivity for most common peripherals, even though it doesn't include Ethernet, audio, or video ports.

The Alto's primary function is to raise the notebook so you don't hold your head at an unnatural angle to view the screen. Logitech also integrates one of its outstanding, full-sized keyboards into the Alto's base.

The Alto doesn't use clasps to hold your PC in place. Instead, it uses a ledge of rubberized material to hold your notebook in position; a collapsible stand then holds up the bottom of the notebook and locks into place to provide added stability. My Toshiba Satellite fit but didn't sit quite as securely as a boxier ThinkPad. The Satellite's sharper angles meant that it slid off the edge a bit. The Alto supports notebooks up to 9 pounds.

Although its design attempts to maximize compatibility with laptops, the Alto locks into only one position, making for a nonadjustable stand. I liked the notebook's position, so this wasn't really a problem. It might be a concern if you are significantly above or below average height, though.

The Alto includes a USB 2.0 hub with three USB ports. The hub and USB ports share the USB connection by which you connect the Alto's integrated keyboard to your notebook.

When it's not in use, the Alto folds up and locks into storage position with a hidden, magnetized latch. It's probably a little bit long to be considered easily portable, but users with larger notebook cases should be able to move it. With its all-black design and orange, back-lit, LED indicators, the Alto looks sharp.

All in all, the Alto is an attractive package, but you'll be wise to try it out with your notebook before purchasing. ▲

by Shawn Mummert

Alto
$99.99
Logitech
www.logitech.com
●●●◖

Specs: Full-sized keyboard; supports notebooks up to 9 pounds; USB 2.0 hub; LED status lights

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

Vigor Gaming Force Recon QXN

Meet Vigor Gaming, a California-based PC boutique that offers high-end desktops and notebooks. I checked out the Force Recon QXN, which Vigor Gaming overclocks on request.

My review system sported an Intel Core 2 Extreme X6800 clocked at 3.7GHz (The factory overclock is covered under Vigor Gaming's warranty.) The QXN owes its hefty graphics power to two XFX GeForce 8800 GTX XXX cards in SLI.

This particular QXN doesn't have one of Vigor Gaming's custom paint jobs, but it's plenty snazzy, thanks to two large, blue LED intake fans at the front panel, a massive side panel exhaust fan behind the motherboard, and some flashing blue lights at the bottom of the PC. That said, QXN's cable management could use an overhaul. The builder left a rat's nest of power supply cables at the top of the system. This doesn't obstruct the system's airflow and wouldn't be a problem if the case window didn't extend to the top of the case. Vigor Gaming tells me that it's working to reduce the amount of cable clutter.

Thanks to those 8800 GTXes and the overclocked processor, the QXN holds its own in the gaming and office applications. It scored 16018 in 3DMark06 and offered a frame rate of 106.94fps in Quake 4. The system topped many of the scores that the similarly configured Cyberpower Gamer Infinity SLI KO produced.

Vigor Gaming seems to have a grip on what makes a gaming PC. It also has some great warranty and customer service features, offering customers lifetime phone tech support and 24/7 email tech support as an option. I was surprised to reach a service tech over the phone as soon as I called; I didn't encounter a machine. The standard warranty isn't too shabby either: All desktops include a 30-day, money-back guarantee, three-year parts, and lifetime labor warranty. ▲

by Joshua Gulick

Force Recon QXN
$4,734
Vigor Gaming
www.vigorgaming.com
●●●◐

Specs: Intel Core 2 Extreme X6800 at 3.7GHz; Asus P5N32-E SLI; 2GB Corsair CM2X1024-8500C5; 768MB XFX GeForce 8800 GTX XXX (SLI); 500GB Western Digital Caviar SE16 WD5000KS; 150GB Western Digital Raptor WD1500ADFD (2X, RAID 0); 900W Tagan TG900-U96 PSU, Windows XP Pro

Plextor PX-B900A

PX-B900A
$999
Plextor
www.plextor.com
●●●◐

Like its competitors, Plextor's Blu-ray disc drive for the PC is basically a DVD burner on steroids, writing up to 50GB on one disc. And in the age of HD camcorders and 750GB hard drives that need backing up, it's just what you need.

As you'd expect, the PX-B900A uses write-once BD-R and rewriteable BD-RE media. So what sets it apart from, say, Sony's BWU-100A? For starters, Plextor's unit is sometimes a lot faster (up to 45% faster when writing to CD-RW or DVD+RW) or a tad faster (roughly 5% faster with BD-R and BD-RE media). Plextor also bundles Ulead's rather capable suite of disc-burning and video-editing programs. (Sony's drive is saddled with CyberLink's sometimes buggy InstantBurn software.) The BWU-100A's edge? Street prices hover around $699, compared $816 for the PX-B900A.

The unexpected plus is the Ulead software bundle. Granted, you don't get the cutting-edge disc-burning features of a Nero or the video manipulation moxie of an Adobe Premiere. But for most users who want to burn data discs, do light video assembling and editing, and create movies to play in the BD set-top boxes, Ulead's wizard-driven software is a snap. For example, with VideoStudio, you can cull a clip from a DVD movie and seamlessly mix it onto disc with video taken from a connected video cam in about 5 clicks. One quibble: the software isn't integrated. You use one tool for general disc burning, another for video, and for BD movies, BD versions of both.

The PX-B900A drive is a solid, reliable buy, backed by unlimited tech support. Once the street price dips below $700, this is a drive to snap up. ▲

by Robert Luhn

Performance Results

Media	Time (minutes:seconds)
CD-R (702MB)	8:52
CD-RW (4X): 130MB, 141 files	4:48
CD-RW (10-24X): 130MB, 141 files	1:18
DVD-R DL (8X): 7.71GB, 6 files	28:11
DVD+RW (2X): 3.39GB, 2081 files	21:03
DVD-RW (2X): 3.39GB, 2081 files	50:38
BD-R (2X): 23.2GB, 3730 files	47:42
BD-RE (2X): 5.69GB, 3914 files	25:27

Specs: 2X/2X/2X (write/rewrite/read) BD-RE, 4X DVD±R DL, 8X/8X/8X DVD+RW, 6X DVD-RW, 5X DVD-RAM, 8X DVD±R, 24X/16X/24X CD- /RW/; 8MB buffer; IDE/ATAPI; one-year warranty

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◐ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

Corsair XMS2 Dominator TWIN2X2048-10000C5DF

Corsair continues to up the ante in the high-end DDR2 memory market with the latest addition to its flagship Dominator series of products, the XMS2 TWIN2X2048-10000C5DF. As its name implies, the TWIN2X2048-10000C5DF kit consists of two 1GB sticks of PC2-10000 RAM capable of running at a CAS latency of 5. And like the other members of the Dominator family, the TWIN2X2048-10000C5DF features Corsair's DHX (Dual-path Heat Xchange) technology and EPP (Enhanced Performance Profiles). It also includes the Dominator Airflow fan, which actively cools the memory for enhanced stability and overclockability.

The TWIN2X2048-10000C5DF kit is rated for operation at an impressive 1,250MHz, which makes this some of the fastest DDR2 system memory currently available. With a frequency this high, the TWIN2X2048-10000C5DF kit is obviously targeted at hardcore overclockers. But when coupled with the right platform, it's surprisingly easy to take advantage of the high frequencies this memory offers. By simply installing the kit into an Evga nForce 680i SLI motherboard, which supports EPP, and enabling the SLI Memory feature in its BIOS, it was only a matter of seconds before I was able to run the memory at its rated speed with an automatic 5% CPU overclock.

With a Core 2 Extreme X6800 and the SLI Memory feature enabled, Corsair's TWIN2X2048-10000C5DF kit offered just over 6GBps of bandwidth in SiSoft Sandra XI's buffered memory bandwidth benchmark. But by lowering the CPU's multiplier, manually configuring a 1:1 linked memory ratio and upping my system's FSB to 1,250MHz, the bandwidth jumped to almost 6.7GBps in the same benchmark. And that was without any serious CPU overclocking.

Corsair's TWIN2X2048-10000C5DF kit currently represents the pinnacle of DDR2 system memory. Overclockers looking for the best of the best, look no further. Just be prepared to shell out some serious coin, though. This stuff doesn't come cheap. ▲

by Marco Chiappetta

TWIN2X2048-10000C5DF
$650
Corsair
www.corsairmicro.com
● ● ● ●

Specs: Capacity: 2GB (2x 1GB); latencies: 5 (CAS Latency), 5 (tRCD), 5 (tRP), 18 (tRAS), 2T (Command Rate); voltage: 2.4V; lifetime warranty

XFX GeForce 8800 GTX 630M XXX Edition

When Nvidia initially introduced the GeForce 8800 GTX, the company blocked its partners from offering factory-overclocked models. Instead, the whole lot of initial GeForce 8800 GTX cards, regardless of brand, shipped with GPU cores clocked at 575MHz and memory clocked at 900MHz (1.8GHz effective). Nvidia recently had a change of heart, however, and its partners responded by shipping preoverclocked 8800 GTXes that make what was already the fastest graphics card available even faster.

XFX in particular has done great things with the GeForce 8800 GTX. Its top-of-the-line GeForce 8800 GTX 630M XXX Edition blows past stock GeForce 8800 GTX cards with its 630MHz GPU core and 1GHz (2GHz effective) memory. The Radeon X1950 XTX was the first card to offer frame buffer memory this fast, but it used GDDR4 RAM. XFX managed the feat using selectively binned, high-speed GDDR3. Although the 630M XXX Edition's Nvidia green PCB replaces the black PCB found on earlier XFX 8800 GTX cards, it's barely visible underneath the huge, dual-slot cooler, anyway. Other than its clock speeds and PCB color, not much has changed. Don't expect to find any type of exotic cooling on this card.

The higher clock speeds do yield marginally better performance. In my test system, which consisted of an Evga nForce 680i SLI motherboard, 2GB of memory, and a Core 2 Extreme X6800 processor, the XFX GeForce 8800 GTX 630M XXX Edition put up 38fps in F.E.A.R. at 2,560 x 1,600 with 4XAA/16XAF. At the same settings, the overclocked 8800 GTX raced through Quake 4 at 86.8fps. By comparison, a stock 8800 GTX only managed 35fps and 80.2fps, respectively. Its higher clock speeds didn't propel the XFX GeForce 8800 GTX 630M XXX Edition into a totally new performance segment, but it's a seriously fast video card. ▲

by Marco Chiappetta

GeForce 8800 GTX 630M XXX Edition
$639
XFX
www.xfxforce.com
● ● ● ●

Specs: GPU: Nvidia GeForce 8800 GTX; GPU clock: 630MHz; memory: 768MB GDDR3 1GHz (2GHz effective); dual dual-link DVI outputs; double lifetime warranty

CPU RANKING ○ **0 = ABSOLUTELY WORTHLESS** | ●●◖ **2.5 = ABSOLUTELY AVERAGE** | ●●●●● **5 = ABSOLUTELY PERFECT**

HP LP3065

HP's LP3065 30-inch LCD monitor is, in a word, awesome. This LCD is ostensibly about real estate, but its performance and good looks are as remarkable and impressive as the amount of work you're able to display at once. I replaced my 19-inch Dell E196FP LCD with the LP3065, and it was like replacing a minivan with a Hummer limo. The LP3065 easily stands toe-to-toe with monster displays from the likes of Dell and Apple.

Setup took almost no time; the hardest part was making room on the desk. The screen slides and snaps into the heavy, good-looking base, where it can vertically adjust up to 5.1 inches and swivel 45 degrees in either direction from straight on. The LP3065 boasts three dual-link DVI connectors and includes two DVI cables which were in the box. The driver disc includes a utility called LiteSaver that dims the screen after a user-set time of no activity.

Sitting in front of the LP3065 is like sitting in the front row at a movie theater. The screen is bright and sharp, and the backlight covers almost every square inch evenly. (There was a little bit of darkening along the sides.)

I ran testing software from Eizo and iiyama, and the LP3065 looked almost perfect throughout. It was dead-on in the convergence tests, clear in the read tests, sharp in the contrast test, and fast in the high-voltage black/white tests. The only flaw I noticed was a very thin pattern across the screen toward the bottom in the moiré test. But I didn't notice this phenomenon when working on images in Photoshop or watching a movie.

Native resolution is 2,560 x 1,600, with a 0.25mm pixel pitch and an astonishing 92% color gamut. The 16:10 aspect ratio provides enough space for Photoshop to display large images plus all of my Photoshop palettes that normally overlay the image on my 19-inch monitor. A 22-inch CAD drawing in VectorWorks, which normally forces me to scroll around, fit entirely on-screen.

I watched "The Departed" and had no adjustments to make for brightness or color. Skin tones were excellent; black was black; reds were acceptably bright with no blooming; and detail in dark areas was fine. The 8ms response rate kept the images moving with no distractions.

This monitor is meant for work, however, not play. Designers and image editors should find it a boon to their productivity. The HP LP3065 is well worth its $1,699 price. ▲

by David Finck

Specs: 2,560 x 1,600 @ 60Hz; 29.7-inch viewable area, 1000:1 contrast ratio; 8ms response rate (gray to gray); 16:10 widescreen aspect ratio; 92% color gamut; 178-degree viewing angle.

LP3065
$1,699
HP
www.hp.com
●●●●◖

Antec Spot Cool

Heat is your PC's worst enemy. Whether you have a cutting-edge gaming rig that generates more heat than the guns blasting away in your games or a home business system chugging away under the makeshift desk in the basement, if your system's too hot inside, components get cranky.

The Antec Spot Cool handles heat easily and quietly, wherever it flares up. The three-speed, adjustable-direction fan mounts on your motherboard and plugs into any available three-pin connector on your motherboard. Its 4.5-inch flexible stem and swivel head let you aim the breeze at any component or interior area you want to cool.

I had some difficulty installing the Spot Cool because the system I wanted to cool was packed tight already. I screwed the base to the chassis strut rather than the mobo and had to replug the rear cooling fan to plug in the Spot Cool. But once I installed it, it worked great. The ambient temperature inside my system dropped from 84 to 78 degrees Fahrenheit with the lowest speed setting. Blow away the heat coming off your graphics card or RAM, and these components should stay happy.

PC fans are notoriously noisy. Not the Spot Cool. It added no extra noise on low speed and was barely audible at high speed. The dark blue light should be fun for those with windowed cases. ▲

by David Finck

Specs: 3-speed switch; RoHS compliant; dBA range: 23 to 33; CFM range: 15 to 22; blue LED illumination

Spot Cool
$19.95
Antec
www.antec.com
●●●◖

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

Anand's Corner

by Anand Lal Shimpi

A Brief History Lesson, Preparing For Barcelona

If AMD was competing strictly with Intel's Pentium 4 team, we'd be living in a very different world. Although Pentium 4 performance went up dramatically from the original Willamette core to its immediate successor, the transition from Northwood to Prescott didn't exactly improve performance so much as send power requirements through the roof. AMD couldn't have been happier; in the few times that Intel updated its NetBurst microarchitecture, performance didn't go up. What AMD wasn't counting on, though, was Intel's team in Israel being far more prudent about making things better.

By now you've undoubtedly heard the story of the team from Israel, but just in case, here's a quick recap that may include a fact or two you didn't know. Intel's IDC (Israel Development Center) was commissioned to build a core called Timna, announced around the same time as Intel's NetBurst architecture, interestingly enough. Timna would be a highly integrated system on a chip combining an Intel CPU, Intel Graphics and a memory controller, targeted at making sub-$600 PCs a reality. After Timna was completed, however, Intel pulled the plug on the design; there were issues with the memory controller, and even more importantly, it became plainly obvious that the sub-$600 PC market could actually be addressed using current CPU, chipset, and mobo platforms. Timna was born obsolete and the IDC team was left in shambles.

Almost immediately afterward, Intel recommissioned the Timna team to work on a brand-new mobile architecture. Fueled by a desire to impress the very same people who canceled Timna, the engineers at IDC went to work, throwing out the Pentium 4 as a possible base for the new chip as it was far from power optimized, and building instead on much of what it had learned from Timna.

You see, in order to keep costs down, Timna had to be a low-power chip; this would allow Intel to simplify power delivery on the motherboard and keep total system cooling needs to a minimum. The Timna team used much of what it had learned in producing a very low-power, P6-derived architecture into the new mobile design that was first called Banias.

Banias made its debut in 2003 as the Pentium M, a part of Intel's Centrino platform, but the team didn't stop there. Almost immediately after completing Banias, the team started work on its successor: Dothan. A year later, Intel introduced Dothan as the first evolutionary successor to the Pentium M. The process repeated itself again in 2005, when Dothan gave way to a more highly evolved chip we've come to know as Core Duo (Yonah). And, of course, one year later Intel introduced the world to Conroe and Merom, or Core 2 Duo, and the rest is history.

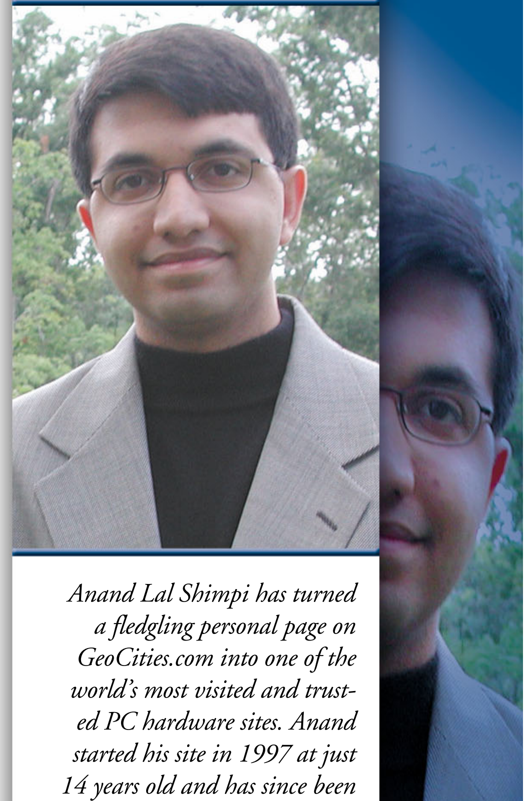
While AMD was doing a great job of competing with Intel's Pentium 4, it ignored the threat that the work in Israel posed. In the four years that AMD's K8 architecture had been around, Intel's IDC had updated the Banias architecture three times. Short of process shrinks and minor tweaks, AMD had released nothing to compete. So when Core 2 made its debut, Intel's dominance should not have come as a surprise—it took four architectures from Intel to catch up, and not a single response from AMD.

By mid-2007, however, the game will change. Barcelona, the long-awaited evolutionary update to K8, will make its debut. Many of the changes that AMD implemented in Barcelona are akin to what Intel did when moving from Yonah to Merom, so we'd expect similarly significant performance gains.

In the area of power consumption, AMD went one step beyond anything Intel has done to date, allowing each core in Barcelona to be clocked independently. Independently clocked cores should prove useful for power savings when running single-threaded applications or lightly multithreaded ones. And although all cores still run at the same voltage, the memory controller is now on a separate power plane.

All in all, AMD's Barcelona core is one very overdue update to the K8 architecture. While we have yet to see real performance numbers, the important question isn't about Barcelona's performance so much as it is whether AMD will move to two-year design cycle with reasonably significant refreshes during the years in between. It would seem that such an approach is going to be necessary to compete with the new Intel. ▲

Talk back to Anand at anand@cpumag.com.



Anand Lal Shimpi has turned a fledgling personal page on GeoCities.com into one of the world's most visited and trusted PC hardware sites. Anand started his site in 1997 at just 14 years old and has since been featured in USA Today*, CBS' "48 Hours," and* Fortune*. His site—www.anandtech.com—receives more than 55 million page views and is read by more than 2 million readers per month.*

Many of the changes that AMD implemented in Barcelona are akin to what Intel did when moving from Yonah to Merom . . .

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Vista has ARRIVED

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Intel Plumbing Leaks Addressed

by Alex "Sharky" Ross

Perhaps the most interesting PC-related event of the year seemed to slip under the radar. With all of the hoopla surrounding Windows Vista, Intel's next-generation process got very little exposure. The fact that the company even let loose with any information this early is very welcome, if very unusual. What I know thus far is that Intel is basing the next-generation processors on an entirely new 45nm process (that's down from the current 65nm) with a major breakthrough in terms of addressing electrical leakage (unwanted current that flows through the gate dielectric in a transistor), which has in the past gone hand in hand when shrinking die sizes. The smaller the die size, the harder it is for the gate dielectric to serve as an insulator. At 65nm, Intel was already stretching the limits of its already thin gate oxide.

The 45nm process is set to change leakage problems via the implementation of a new high-k gate dielectrics and metal gate transistor. According to Intel's co-founder, Gordon Moore, this new transistor implementation is the "biggest change in transistor technology since the introduction of the polysilicon gate MOS transistors in the late 1960s." Strong words indeed, but coupled with the die-shrink to 45nm, Intel is touting some seriously trick benefits in comparison to its current 65nm process.

Intel expects roughly twice the improvement in transistor density for smaller chip sizes, as well as with chips with larger transistor counts. The company also anticipates the new process will yield roughly a 30% reduction in transistor switching power and at the same time more than 20% faster transistor switching speed (or greater than five times reduction in source-drain leakage). Intel also expects about 10 times reduction in gate oxide leakage. All of this leads to not only smaller, faster processors, but also more efficient processors; the first of which (code-named Penryn) Intel is targeting for release before the end of this year.

Intel will ramp up production with three new fabs over the coming years, starting with D1D in Hillsboro, Ore., where the first samples have been developed and tested. By the end of February, Fab 32 in Ocotillo, Ariz., should be online and ready to manufacture 45nm processors for the second half of this year, with Fab 28 in Israel firing up next year.

Details on the upcoming Penryn-based CPU have been sketchy thus far, but expect it to feature at least 410 million transistors in its dual-core incarnation and double that to 820 million for the quad-core monster. When compared to today's Intel quad-core processor's 582 million, the jump in transistors seems pretty mind-blowing. Much of this transistor count increase stems from the expected larger cache sizes and a new SSE4 instruction set. Penryn will have very similar thermal properties to Conroe in terms of power consumption—despite the higher clock speeds. Intel will also add new energy-efficient and power management modes to the 45nm silicon process for the entire Penryn family. On the platform side, Intel is expecting that only minor modifications—of course the company would say that—will be necessary in order to support Penryn. How minor is anyone's guess, but we can obviously expect BIOS updates at the very least.

Intel is obviously giddy about its 45nm design and has already shown several iterations of the Penryn running live. If working/running demos of two 2.13GHz 45nm quad-core processors encoding a video in Adobe Premier in Windows Vista doesn't impress you (and it should at this early stage), then a 1.86GHz 45nm quad-core desktop CPU running Rainbow Six: Vegas in Windows Vista might be more up your alley. Even on the mobile side Intel demonstrated a demo of a dual-core Penryn running Vista and Microsoft Office. If Intel has its way and the process goes smoothly, we will be getting faster, more efficient, and cheaper-to-manufacture processors just about the same as we have had in previous years—only no leaky ones please!

Disrupting Reuters' newswire with a cheery Christmas greeting at age six, Alex "Sharky" Ross became an avid computer user/abuser, eventually founding popular hardware testing/review Web site SharkyExtreme.com. Exposing shoddy manufacturing practices and rubbish-spouting marketing weasels while championing innovative products, illuminating new technology, and pioneering real-world testing methods was just a front for playing with the best toys. The site acquired, he left in 2001. A London native and London School of Economics graduate, Alex currently overclocks/tunes Porsche 996 Turbos with www.sharkwerks.com when he's not tweaking PCs.

> Intel is obviously giddy about its 45nm design and has already shown several iterations of the Penryn running live.

Email me at sharky@cpumag.com

PC Modder

Tips & Tutorials

Modding does the body good. A PC's body anyway, inside and out. Here you'll find hardware, firmware, tools, tips, and tutorials for modding your rig's performance and appearance. Send us your own mod-related tips and ideas at modding@cpumag.com.

Modding enthusiasts have a penchant for the latest toys. Fast processors, powerful video cards, silent SFF enclosures, and radically lit motherboards are all fair game when it comes to a modder's creative mind. Recognizing the appeal of unconventional customization, an entire industry has emerged to support the community.

Mods & Ends

OCZ Technology XTC Active RAM Cooler

By now, you know that one of the keys to a completely stable, long-lasting, and highly overclockable system is good cooling. The folks at OCZ know this, too, and have introduced an active cooling system designed specifically to wring the utmost performance from your RAM. The aluminum OCZ XTC Cooler ($24.99) is compatible with all DDR1 or DDR2 memory modules; you should expect higher, more stable overclocks and a longer lifespan for your memory modules by using the cooler. OCZ claims it has optimized the cooler's design for its own OCZ XTC heat spreader design, but the benefits of active RAM cooling are universal for all brands of memory. The XTC Cooler features two 60mm, ultra low-noise fans that are illuminated by blue LEDs. If you're looking for a little something extra to squeeze a few more MHz out of your RAM, the OCZ XTC cooler could be just the ticket.

When stock RAM cooling just isn't good enough, OCZ's XTC active memory module cooler provides an extra chill.

SilverStone Olympia OP1000 1KW PSU

With 1KW of power at its disposal, Silverstone's Olympia OP1000 is ready for the beefiest systems.

The hefty power requirements of today's dual- and quad-core processors and high-performing GPUs have spurred many manufacturers to introduce mammoth PSUs that specifically cater to the needs of demanding enthusiasts. The latest company to introduce a 1,000-watt power supply is renowned case maker, Silverstone. The Silverstone Olympia OP1000 ($349.99) features an impressive single +12V rail with and 80A (88A peak) capability, 1,000 watts of continuous power output at temperatures up to 50 degrees Celsius, four PCI Express 6-pin connectors, two PCI-E 8-pin connectors, six SATA power connectors, and Active PFC. Power users in need of a capable PSU should look no further than Silverstone's new Olympia.

Razer Tarantula Gaming Keyboard

It's not often that a keyboard features new innovations, but the folks at Razer have done just that. And in the process, the Tarantula may give hardcore gamers an additional edge over unsuspecting fragbait. The Razer Tarantula ($129.99) features subdued blue backlighting, dual USB ports, headphone and microphone jacks, 10X anti-ghosting technology, customizable macro keys, 32KB of onboard memory, and easy profile switching. In addition to the aforementioned items, the Tarantula offers on-the-fly switching between two keyboard maps per user profile, Hyperesponse gaming keys, and the Razer Battledock modular docking station. The keyboard's anti-ghosting technology means overzealous gamers who mash multiple keys at once won't disrupt gameplay, and you can use the unique Razer Battledock for expansion peripherals, such as a Web cam or over-keyboard lighting.

Give yourself an edge with Razer's Tarantula Gaming Keyboard.

Fashionably Fresh Firmware

Sony BDP-S1 (v1.5)

An update to the BDP-S1 Blu-ray Disc player upgrades BD-Java compatibility, which improves playback compatibility with certain BD-ROMs. It also corrects output signal status information for audio output and display on Linear PCM 5.1-channel soundtracks that are played via HDMI.

esupport.sony.com

Ricoh Caplio R5 (v1.55)

A recent firmware update for the Ricoh Caplio R5 digital camera improves the performance and stability of the camera's USB connection to a computer.

www.ricoh.com

Plextor PX-760A DVD±R/RW (v1.06)

Plextor has released a firmware update for its PX-760A internal DVD±R/RW drive that improves compatibility and interchangeability when connecting it to a SATA controller or SATA/USB converter.

www.plextor.com

by Marco Chiappetta

Video Card BIOS Modding

Manual Overclocking No More!

Overclocking is a relatively easy way to increase system performance, essentially for free. All it takes is a bit of knowledge, a little courage, and some good luck. It's especially useful for tweaking video cards, when every last bit of fill rate and every megabyte of memory bandwidth can have a measurable impact on performance.

The problem with video card overclocking is that it can be downright annoying. Third-party overclocking apps can sometimes cost money and aren't always compatible with cutting-edge cards. Utilities built into ATI's and Nvidia's drivers are somewhat limited, too. Remembering to overclock your card before a gaming session can be a hassle, and even if you set the driver to retain the overclocked settings after a restart, it doesn't always stick.

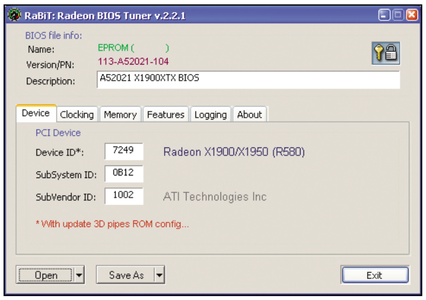
Why not eliminate the need to manually overclock your video card and modify it to always run at its peak stable frequencies? It's only a matter of altering a few parameters in the card's BIOS and flashing the new BIOS to the card.

Modding most of today's video cards' cores and memory to run higher than stock frequencies is a fairly straightforward process once you have the right tools and an intimate knowledge of your card. We'll show you exactly what it takes to mod ATI- and Nvidia-based graphics cards using some tools that are readily available online and, perhaps best of all, free.

The Prep Work

Before we detail the steps necessary to mod your video card's default frequencies via its BIOS, we're going to assume that you've already spent plenty of time overclocking your card and know its absolute limits. We don't want you to perform these mods and end up frying your card(s), so take note: The GPU and memory frequencies we use may be higher than what your card can handle, and performing any mods will undoubtedly void your warranty. Consider yourself warned. Before performing this mod, be absolutely certain you know exactly what your card is capable of. If you're unsure of your card's limits, see "I Wanna Go Fast" on page 64. The article explains in detail how to overclock video cards and how you'll know when you've taken things too far.

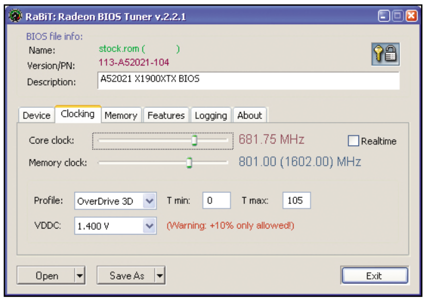
We also recommend that CrossFire or SLI users with multiple graphics cards perform these mods with one graphics card installed in the system at a time. The tools we used were perfectly capable of detecting and modding individual cards while another card occupies the other PEG slot, but it's better to be safe than sorry. It's also a good idea to have your machine connected to a UPS if the power fails during the BIOS flashing process.



BIOS file info:
Name: EPROM ( )
Version/PN: 113-A52021-104
Description: A52021 X1900XTX BIOS

PCI Device
Device ID*: 7249 Radeon X1900/X1950 (R580)
SubSystem ID: 0B12
SubVendor ID: 1002 ATI Technologies Inc
* With update 3D pipes ROM config...

Use RaBiT to extract and save the video card's original BIOS prior to modification. Should a problem arise, you'll be glad you saved a copy of the original BIOS.



BIOS file info:
Name: stock.rom ( )
Version/PN: 113-A52021-104
Description: A52021 X1900XTX BIOS

Core clock: 681.75 MHz ☐ Realtime
Memory clock: 801.00 (1602.00) MHz
Profile: OverDrive 3D T min: 0 T max: 105
VDDC: 1.400 V (Warning: +10% only allowed!)

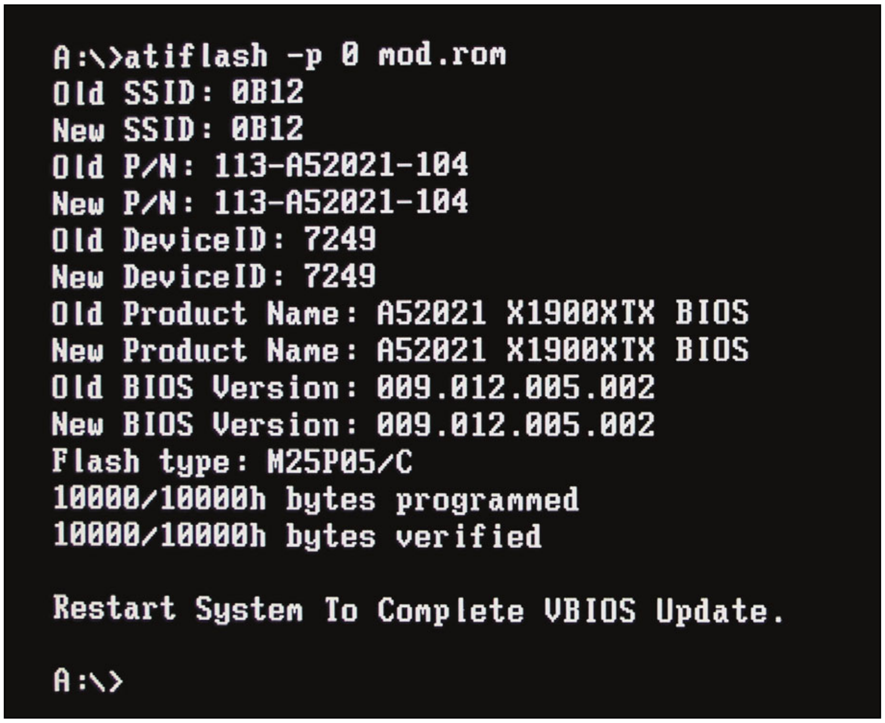
For more adventurous overclocking, you can tweak voltages and memory timings with RaBiT, but we stuck with basic core and memory frequency mods.

ATI-Based Cards

To modify both ATI- and Nvidia-based graphics cards to always run at overclocked frequencies, you'll need to modify the cards' BIOSes and flash them with a modified one that contains the appropriate parameters. To do this with an ATI Radeon X1900 XTX test subject, we used a couple of easy-to-find utilities, RaBiT (Radeon BIOS Editor) v2.2.1 and ATIFlash v3.25. We also needed a bootable floppy diskette.

Step one. From within Windows, we launched RaBiT and clicked the Open drop-down menu. Then, we clicked the Onboard EEPROM option to read the stock BIOS into memory. Next, we clicked the Save button to save a copy of the original BIOS (we named our copy stock.rom) and closed RaBiT. It's a good idea to store a copy of the stock BIOS in a safe location if you ever want to revert the card back to its stock condition or if you need it in the event of a problem. We also made another copy of the original stock BIOS file, which was the one we used for the mod.

Step two. We relaunched RaBiT and clicked Open again. But this time, we selected ROM BIOS File. We browsed to the second copy of the BIOS file we saved in step one and opened it. This populates all of RaBiT's menus with the details regarding a particular card. If you click the various tabs, you'll see that there are quite a few tweakable parameters. We're going to focus solely on GPU core and memory



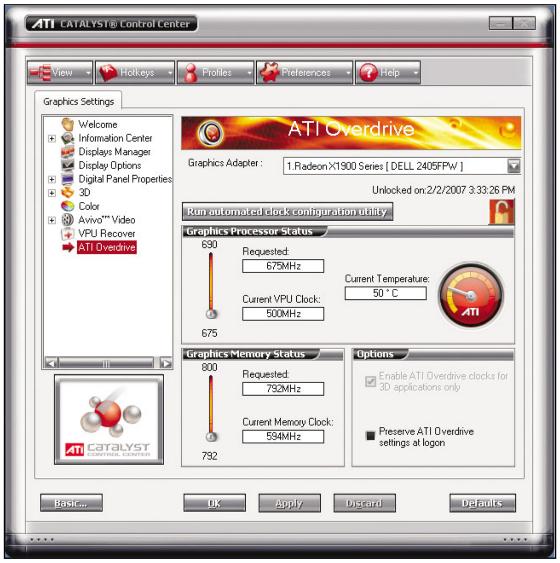
```
A:\>atiflash -p 0 mod.rom
Old SSID: 0B12
New SSID: 0B12
Old P/N: 113-A52021-104
New P/N: 113-A52021-104
Old DeviceID: 7249
New DeviceID: 7249
Old Product Name: A52021 X1900XTX BIOS
New Product Name: A52021 X1900XTX BIOS
Old BIOS Version: 009.012.005.002
New BIOS Version: 009.012.005.002
Flash type: M25P05/C
10000/10000h bytes programmed
10000/10000h bytes verified

Restart System To Complete VBIOS Update.

A:\>
```

To actually flash the video card with the modified BIOS file, we recommend booting to a DOS prompt and using ATIFlash. Call us paranoid, but we prefer not to use Windows-based tools for BIOS flashing whenever possible.

Tools Of The Trade

There are a number of tools available for modifying and flashing ATI and Nvidia video card BIOS files. We chose a couple of the most popular and thorough for these mods for the sake of availability and reliability, but if you're comfortable with others, give them a shot. If you'd like to follow the exact procedures we've outlined here, however, RaBiT, ATIFlash, NiBiToR, and nvFlash are readily available for download from several sites. Techpowerup.com and Mvktech.net are a couple of popular Web sites that have active forums for modders in need of assistance. We suggest starting there and downloading the latest versions available of each utility for your video card. ▲

frequency manipulation, but there are several other options here for the more adventurous among you.



Graphics Adapter : 1.Radeon X1900 Series [DELL 2405FPW]

Unlocked on:2/2/2007 3:33:26 PM

Requested: 675MHz

Current VPU Clock: 500MHz

Current Temperature: 50 ° C

Requested: 792MHz

Current Memory Clock: 594MHz

☑ Enable ATI Overdrive clocks for 3D applications only

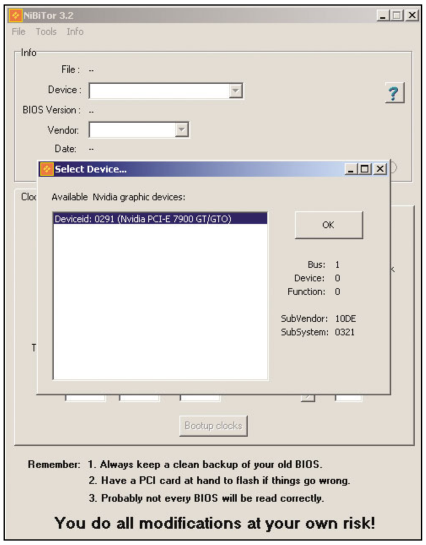
■ Preserve ATI Overdrive settings at logon

To verify the mod was successful, open the Catalyst Control Center and click Overdrive. Don't be alarmed if the frequencies don't exactly match those you set in RaBiT: It's normal for them to be off by a couple of MHz.

Once we loaded the X1900 XTX's BIOS file into RaBiT, we clicked the Clocking tab. Then, we clicked to the Profile drop-down menu and selected OverDrive 3D. Most of ATI's current cards are configured to run at different frequencies in 2D and 3D modes, hence the separate Overdrive 2D and OverDrive 3D entries. However, only the 3D frequencies will have an impact on gaming performance, so there's no need to alter 2D frequencies. Our Radeon X1900 XTX's stock core and memory frequencies were 648MHz and 774MHz (1.54GHz effective), respectively. Because we had predetermined that our card was capable of running with its core clocked at 688MHz and its memory at 812MHz, we decided to increase its respective 3D frequencies to 681.75MHz and 801MHz, leaving the card with a bit of headroom. We clicked the Save button and saved the modified BIOS using the filename mod.rom.

Step three. With our modified BIOS file at the ready, it was time to perform the actual mod. We copied the Mod.rom file and the ATIFlash utility to a bootable floppy. (A bootable USB flash drive will also work.) Then, we restarted our system and booted to the floppy. If you'd like to see all of ATIFlash's available options, run the program without any command line parameters (type **atiflash** and press ENTER) and it will present a comprehensive list. We were only interested in the -p parameter, which writes BIOS files to an ATI-based video card. The -p parameter requires you to enter the card's ID and the BIOS filename. Because we had only one card in our system, the video card's ID was 0. If we had a pair of cards installed, the primary card would be identified as 0 and the secondary card by 1. To perform the actual mod, we typed **atiflash -p 0 mod.rom** and pressed ENTER. The process took a few seconds and prompted us to restart the system after it finished.

Step four. Once our system restarted, we let our OS boot normally. When fully booted, we went into the driver control panel and checked that the card was running at its new, higher frequencies. In our case, the requested values listed after we



File : --
Device :
BIOS Version : --
Vendor:
Date: --

Available Nvidia graphic devices:
Deviceid: 0291 (Nvidia PCI-E 7900 GT/GTO)

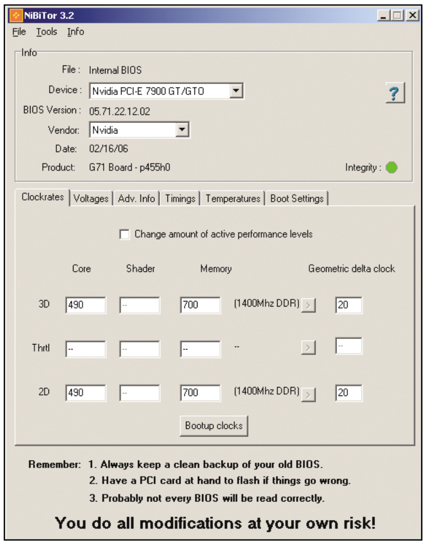
Bus: 1
Device: 0
Function: 0

SubVendor: 10DE
SubSystem: 0321

Remember: 1. Always keep a clean backup of your old BIOS.
2. Have a PCI card at hand to flash if things go wrong.
3. Probably not every BIOS will be read correctly.

You do all modifications at your own risk!

We used NiBiTоR v3.2 to extract our GeForce 7900 GT card's BIOS.



File : Internal BIOS
Device : Nvidia PCI-E 7900 GT/GTO
BIOS Version : 05.71.22.12.02
Vendor: Nvidia
Date: 02/16/06
Product: G71 Board - p455h0
Integrity : ●

☐ Change amount of active performance levels

	Core	Shader	Memory		Geometric delta clock
3D	490	--	700	(1400Mhz DDR)	20
Thrtl	--	--	--	--	--
2D	490	--	700	(1400Mhz DDR)	20

Remember: 1. Always keep a clean backup of your old BIOS.
2. Have a PCI card at hand to flash if things go wrong.
3. Probably not every BIOS will be read correctly.

You do all modifications at your own risk!

Some Nvidia-based graphics cards require you to simultaneously alter the core and memory clocks for both 2D and 3D graphics. If you launch NiBiToR, open your BIOS, and see different 2D and 3D frequencies, you only need to change the 3D clocks to increase gaming performance.

clicked Overdrive in ATI's Catalyst Control Center were 675MHz (GPU) and 792MHz (memory), up from the stock 648MHz and 774MHz.

Nvidia-Based Cards

The steps necessary to modify an Nvidia-based graphics card's BIOS are very similar to ATI's. For our Nvidia mod, we used a GeForce 7900 GT card, free utilities NiBiTor (Nvidia BIOS Editor) v3.2 and nvFlash v5.40, and a bootable floppy diskette.

Step one. First, we launched NiBiTor and clicked Tools, Read BIOS, and Select Device. In the new pop-up window, we selected our graphics card and clicked OK. Then, we returned to the Tools menu and selected Read BIOS again, but this time we clicked Read Into NiBiToR. This loaded the stock BIOS into memory. We clicked File menu and Save BIOS to save a copy of the original BIOS. (Back it up for safekeeping.)

Step two. Next, we clicked the Clockrates tab within NiBiTor. You'll see options for 2D and 3D core/memory frequencies. Some Nvidia-based cards use the same frequencies for 2D and 3D (ours did). If your card lists the same values for 2D and 3D, modify both sets of frequencies. By default, our card was configured to operate with a 450MHz core and 660MHz memory. Because we knew it could run at 495MHz/705MHz, we changed the 2D and 3D core and memory frequencies to 490MHz and 700MHz, respectively. Like the modified ATI BIOS, we saved a copy of the newly modified BIOS as mod.rom.

Step three. We copied the Mod.rom file and nvFlash utility to a bootable floppy and restarted our system. At the DOS prompt, use nvFlash to update the card's BIOS.

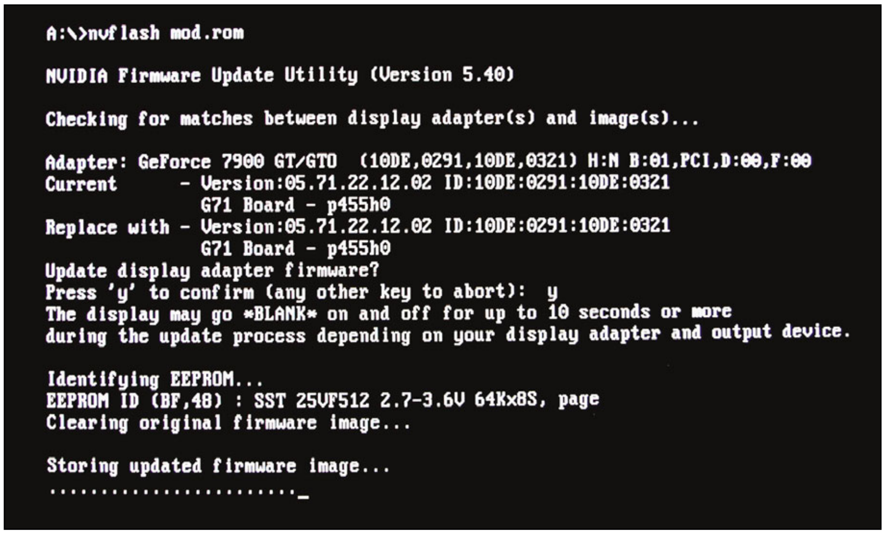
Beware The Bad Flash, Revisited

Anytime you flash the BIOS or modify a device's firmware, you run the risk of catastrophic failure. Should you unexpectedly lose power during the flash, the BIOS file itself is corrupt, or any number of other problems arises, the device you're modifying could be damaged. Luckily, you can easily recover your video card from a bad flash, provided you have the right tools on hand. For more in-depth coverage, please see the "Beware The Bad Flash" sidebar on page 42 in the April 2006 issue of *CPU*. ▲

Because we only had a single card in our system, we typed **nvflash mod.rom** and pressed ENTER. (With multiple cards, you'll have to enter a hardware ID. Type **nvFlash –list** to get the IDs.) A few moments later, we pressed *Y* to confirm the update. The screen flickered momentarily and prompted us to restart our system.

Step four. Once we restarted, we launched the ForceWare Control Panel and checked our card's frequencies. Even without changing any values on the overclocking configuration menu, the new, higher frequencies saved in the modified BIOS file showed up. ▲

by Marco Chiappetta



```
A:\>nvflash mod.rom

NVIDIA Firmware Update Utility (Version 5.40)

Checking for matches between display adapter(s) and image(s)...

Adapter: GeForce 7900 GT/GTO  (10DE,0291,10DE,0321) H:N B:01,PCI,D:00,F:00
Current      - Version:05.71.22.12.02 ID:10DE:0291:10DE:0321
               G71 Board - p455h0
Replace with - Version:05.71.22.12.02 ID:10DE:0291:10DE:0321
               G71 Board - p455h0
Update display adapter firmware?
Press 'y' to confirm (any other key to abort):  y
The display may go *BLANK* on and off for up to 10 seconds or more
during the update process depending on your display adapter and output device.

Identifying EEPROM...
EEPROM ID (BF,48) : SST 25VF512 2.7-3.6V 64Kx8S, page
Clearing original firmware image...

Storing updated firmware image...
.........................._
```

Flashing the video card only takes a few seconds. Be aware that it's normal for the screen to go blank for some or all of the process.

POWER, UNLEASHED

GALAXY DXX

1000W

X3 PCI EXPRESS X2

6P PCI-E 6+2P PCI-E

The first 1KW EPS PSU with Five +12V Rails

The Galaxy DxX series is specifically made for hard-core gammers and those who demand nothing less then perfect. An amazing 900W of combine power for the most extreme Graphics setup you can imagine and it's quad core ready. The DxX also support the upcoming 8Pin PCI Express 2.0, delivering maximum power to the next generation of monster graphic cards.

PHOENIX

3.0mm diamond-cut and hair-brushed aluminum. The first front access micro dust filter with aluminum CD-ROM flip covers integrated.

GLORY

1.5mm aluminum body and internal noise dampening keep this box quite and cool. The one button back up make backing up a snap.

AURORA

Heavy Duty all aluminum keyboard with a sleek slim design. Design with scissors key technology for ease of use and a built in USB port.

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Mad Reader MOD

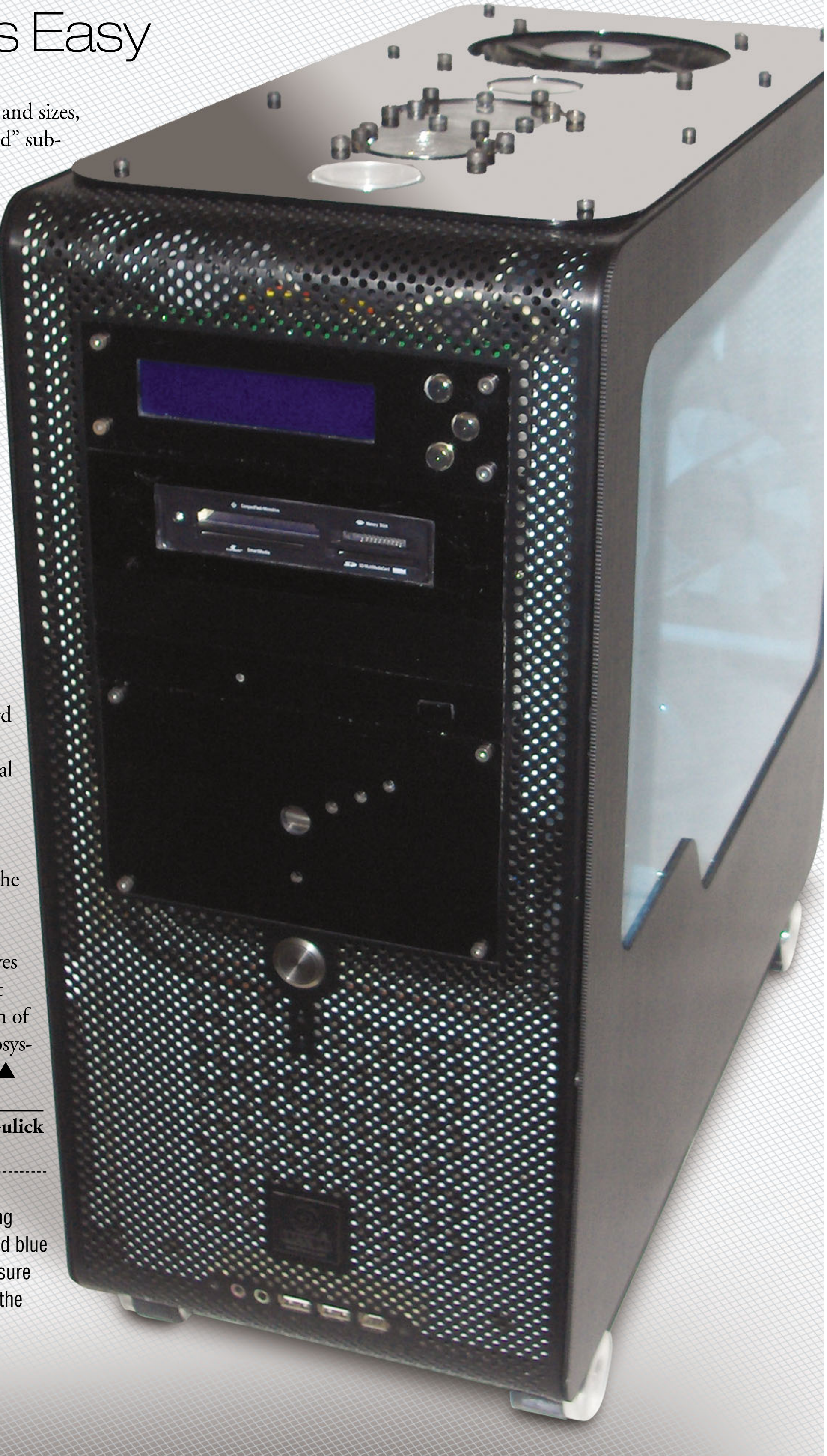
Simple Isn't Always Easy

Although we've seen mods in a variety of shapes and sizes, we've noticed a trend: Many "Mad Reader Mod" submissions include Lian Li cases, which typically have roomy interiors and uncomplicated designs that make them ripe for creative modifications. Bruno Santos, a Portuguese modder who appreciates creative, but uncomplicated designs, kept his mod's theme in mind when he named his system Linear. "It's a word that in Portuguese means basic, simple," says Santos.

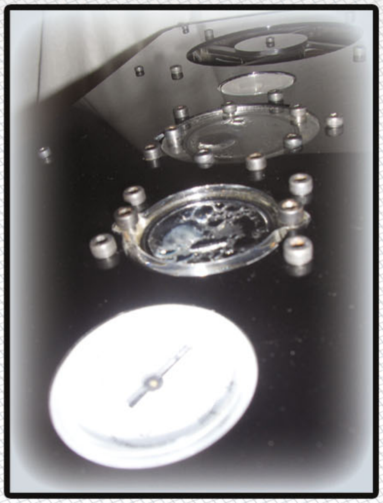
Linear boasts several well-placed, tinted acrylic plates that add personality to the system and hide cables from view. Santos spent much of Linear's 10-month modding process carefully sheathing and routing cables, as well as installing the system's complex watercooling system. "I didn't have it commercially cut because I think I have the expertise—I've worked with metal and CNC before—and I think it's more valuable to do it myself than have it done by others," says Santos. "For me, this is the spirit of modding, it doesn't matter if it's CNC, laser cut, or laser etched, as long as it's you that's operating the machine/tools."

The PC's watercooled components include two hard drives, the video card, and an overclocked 2.66GHz Intel Pentium D 805 at 3.3GHz. Thanks to its unusual design, the watercooling system has plenty of elbow connectors, but Santos doesn't worry that the sharp turns put a strain on water flow. "I've tried the system with most of the elbows removed, and I realized that the elbows don't have much influence in my system, the water flow is reduced about 0.5 liters per hour but the temps stayed the same," says Santos. "I think this proves that a watercooling system is all about balance: It's not the elbows, the pump, the blocks, etc., it's the junction of all the components that make up the watercooling subsystem that makes a solution of this kind worth using." ▲

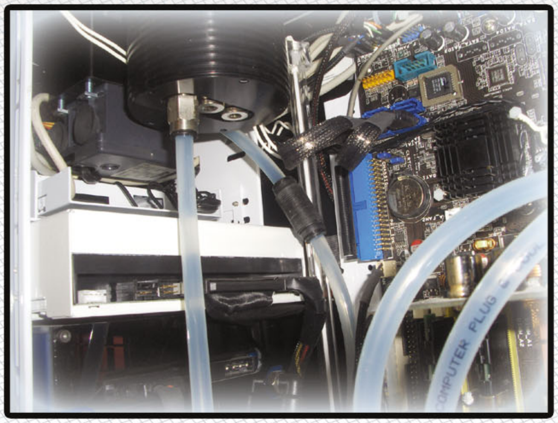
by Joshua Gulick



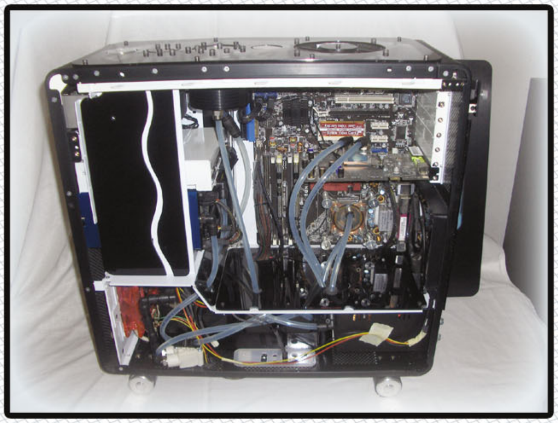
Santos paid close attention to small details when designing Linear. "I think the colored acrylic [I used black, white, and blue acrylic], as well the analogue gauges [which I use to measure the humidity and the ambient temperature] at the top are the most unusual materials I used," Santos says.



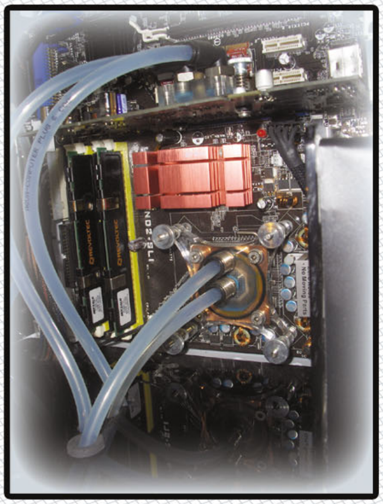
Santos built four tops for his system before he created the lid you see here. "The fan hole was made with the 114mm hole saw, which makes the job of doing a perfect circle very easy," says Santos. "The dials are analogue gauges measuring humidity and ambient temperature; they were taken from a clock."



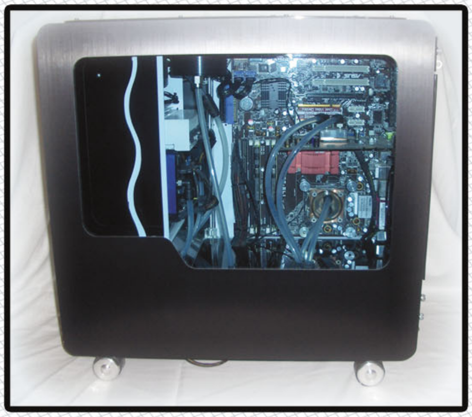
The watercooling reservoir sits at the top of the system. Santos installed a small quick-fit connector in the tubing so he can easily disassemble the system when he needs to.



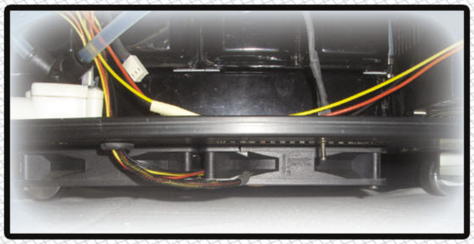
Santos painted Linear's interior white and then used black-tinted acrylic to create unusual designs and mask the cable routing. "The squiggly line, for me, represents the flow of water—like a river or a wave. I think it came out really good," says Santos.



The watercooling system helped Santos overclock the CPU to 3.3GHz. Two 120mm Alphacool NexXxoS Xtreme and one 240mm Xtreme II radiators wick away component heat and reduce Linear's dependence on system fans.



"The window is precut by Lian Li; I went this route because the edge of the side panels has a pattern that is almost impossible to do without a laser," says Santos. "The only problem here was the thickness of the acrylic, as the stock one was 2mm, and I only managed to get the blue tainted in 3mm flavor. This made me do some careful measuring and, using a special Dremel bit, I was able to cut away the needed thickness. In the end, all fitted very well."



Despite the system's size, Santos had some difficulty fitting the 120mm fans into the system. He solved the problem by taking advantage of the PC's clearance from the floor: the fans sit under the system and suck air through the radiator.

Give Us Your Mod

Have a computer mod that will bring tears to our eyes? Email photos and a description to madreadermod@cpumag.com. We're looking for rigs that are recognizable as PCs; your Wookiee mod won't find a home here. If we include your system in our "Mad Reader Mod" section, we'll help you load up your modder's toolbox with $1,500 and a one-year subscription to *CPU*.

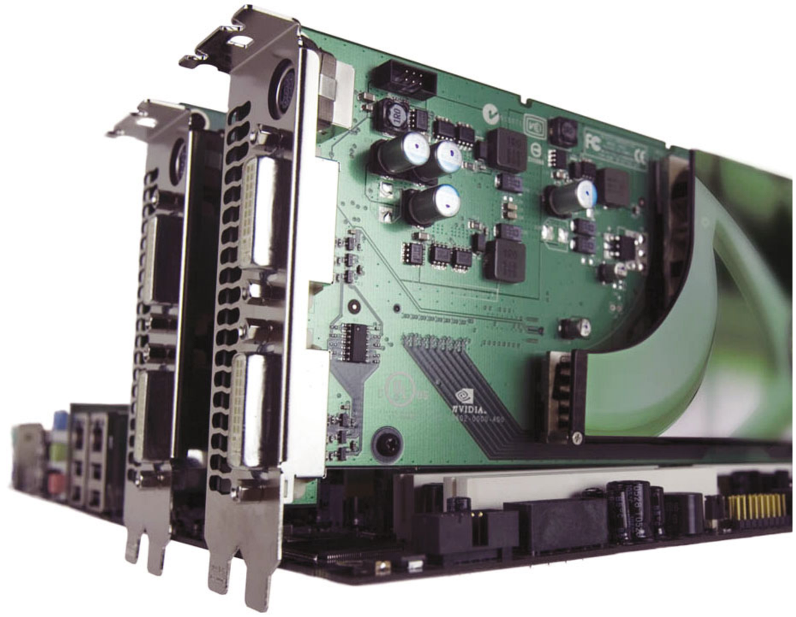
advanced Q&A corner

Get informed answers to your advanced technical questions from *CPU*. Send your questions along with a phone and/or fax number, so we can call you if necessary, to q&a@cpumag.com. Please include all pertinent system information.

> “A single GeForce 7950 GX2 can consume as much as 145 watts of power, so with two of them to feed, he needs to make sure he has at least a 500-plus watt PSU with multiple 12V rails that can supply roughly 25-plus amps on each.”

Each month we dig deep into the mailbag here at CPU *in an effort to answer your most pressing technical questions. Want some advice on your next purchase or upgrade? Have a ghost in your machine? Are BSODs making your life miserable?* CPU*'s "Advanced Q&A Corner" is here for you.*

Woody B. asked: I'm emailing this question for a friend who subscribes to *CPU* but isn't currently online. He says if anyone can answer this, it will be you guys, so here it goes: My friend is using an Asus A8N32-SLI Deluxe motherboard with an Athlon 64 FX-55 processor and 2GB of Corsair DDR400 RAM. He's trying to install two MSI NX7950GX2 video cards for Quad SLI, but his board is saying it won't support the NX7950GX2 cards. Do you know if Asus or Nvidia support this configuration? Any help would be appreciated.

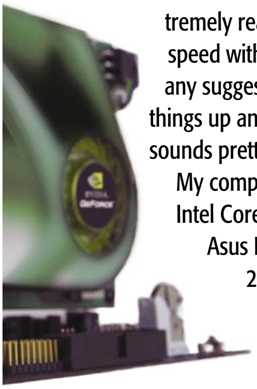


To run a pair of GeForce 7950 GX2 cards in a Quad-SLI configuration, you need graphics cards and a compatible motherboard.

A: The short answer to your question is yes. Nvidia and Asus do support this configuration, and the A8N32-SLI Deluxe should work just fine if your friend installs and links that pair of MSI NX7950GX2 cards together with an SLI bridge. However, your friend will need to satisfy five other requirements to get everything working properly. First, he needs to have a decent power supply. A single GeForce 7950 GX2 can

Asetek's VapoChill LightSpeed is a vapor phase refrigerated cooling system for your processor. It's designed to match up perfectly with some Lian Li cases and provide subzero cooling for extreme overclocking potential.

consume as much as 145 watts of power, so with two of them to feed, he needs to make sure he has at least a 500-plus watt PSU with multiple 12V rails that can supply roughly 25-plus amps on each. Second, your friend needs to flash his motherboard with a current BIOS revision that properly supports the custom PCI Express switch Nvidia uses on the 7950 GX2. As of this writing, the latest BIOS update for your friend's board listed on Asus' Web site is version 1303. Third, he needs to install up-to-date nForce drivers: Version 6.86 of Nvidia's platform drivers for the nForce4 SLI X16 are available on its Web site. Fourth, your friend needs to install an up-to-date version of DirectX 9.0c. Microsoft posted an update on its site in December 2006 that will work. And fifth, he needs to install Nvidia's ForceWare driver version 91.45 or newer on his system, preferably the newest set available on Nvidia's site for the GeForce 7 series (version 93.71 as of this writing). Once all that is done, all your friend will have to do is enter the ForceWare driver control panel, enable Quad SLI, and he should be set.



Tom Z. asked: I'm a big-time overclocker and do it not so much for getting more "value" out of the machines I build but rather to push the limits of performance above and beyond any stock designed product on the market. I overclock my CPUs, memory, graphics card, and even chipset timings in an effort to squeeze every last bit of performance out of my equipment. My current method of cooling for some of my components is a Koolance Exos setup with cooling blocks for my CPU and GPUs. I run a pair of Radeon X1900 XTX cards in CrossFire, as well. My Core 2 Extreme QX6700 quad-core chip runs at 3.3GHz stable at extremely reasonable temperatures, but I want to crank up the clock speed without risking damage or longevity of the CPU. Do you have any suggestions on another cooling method that would let me take things up another notch? I've heard of liquid nitrogen cooling, but that sounds pretty over-the-top—even for me.

My complete system specs:
Intel Core 2 Extreme QX6700
Asus P5W DH Deluxe motherboard
2GB Corsair XMS2-8500 RAM
2 ATI Radeon X1900 XTX
WD Raptor WD1500
Modified Lian Li PC-60 case
Koolance Exos watercooling

A: Wow, Tom, what a rig you have built for yourself! That is a ton of horsepower, and you definitely want to make sure your cooling setup is up to par. Those GPUs probably add a fair amount of stress on the watercooling system you have, along with the QX6700, which pumps a bit of heat on its own. We are sure you want to preserve your investments, so here is a suggestion that might let you really make that sweet Core 2 Extreme quad-core CPU fly while taking a load off your GPUs' watercooler. Your chassis selection is actually ripe for this upgrade, too.

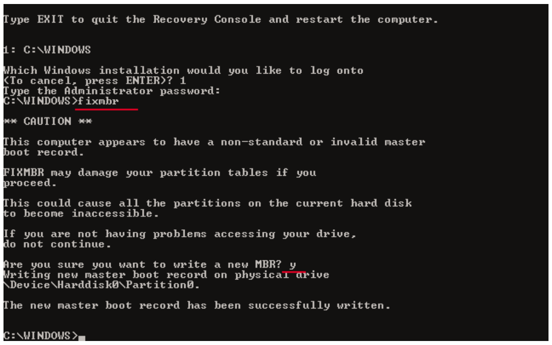
It seems like money is probably no object for you, so we'd suggest you try refrigerated cooling. Your Lian Li case actually will match perfectly with an Asetek VapoChill LightSpeed cooling unit. Right now there are a few companies out there making these products (and rumors say OCZ Technology is coming out with its own line of vapor phase cooling products soon), but VapoChill has been our favorite brand of this type of system for years. And, Asetek's VapoChill LightSpeed systems are actually designed to fit the form factor of Lian Li PC-60 series cases.

The way these vapor phase cooling systems work is by using a mini-refrigerator compressor and standard R507 coolant. These mini-refrigerator compressors are very similar to the type of compressors you can find in compact refrigerators. With a VapoChill unit, however, insulated piping pumps coolant to a larger copper block you mount on your CPU—much like a watercooling setup. Vapor phase cooling goes well beyond water, though, because the cold plate can get down to -15 degrees Celsius at idle with a processor installed and even hold up to below 0 C temps under load.

This setup could be ideal for you actually. You'd have to modify your Lian Li case, but Asetek provides a template for this. You could run the VapoChill LightSpeed's cooling pipe up through the bottom of your chassis with the system sitting on top of the LightSpeed unit (as it is designed to operate) and then you could continue to run your Exos setup on top of your system and use your watercooling blocks just for the GPUs. This would drop your water temps a bit, as well, because you won't have the load of your QX6700 chip on the watercooling setup. Taken as a whole, you're looking at a killer rig there, Tom! We'd dare say you could break 4GHz on your Core 2 Extreme QX6700 with the VapoChill LightSpeed icing things down.

Chaz T. asked: I have a problem that I can't fix for the life of me. It is getting incredibly frustrating, and I need some help before I throw my PC out a window. I had some buddies over one night and we were browsing around some sites we shouldn't have been, and the next morning when I went to use my PC, it wouldn't start up. The system would POST, but then all I got was a blank, black screen with a blinking cursor. I figured I got this from some sort of virus or something, and because I didn't have any really important data on the machine, I reinstalled Windows XP. The problem is, my system refused to boot from the hard drive. I can boot to the Windows CD, it formats the drive and copies over some files, but in the middle of the installation after a couple of reboots, I get the same black screen with a blinking cursor. What's really weird is that if I stick the hard drive in another machine, there are files on it and I can access them. I don't think the hard drive is damaged, but I can't boot to it no matter what I try. Help!

A: We're going to assume that you've already checked your system BIOS and that you're certain your rig is configured to boot from that particular hard drive. If we're wrong in assuming that, go check your BIOS settings. With that aside, it sounds to us like you got hit with some sort of malware that damaged the MBR (master boot record) on your hard drive. The MBR resides on your hard drive and contains a partition table for the disk and a small amount of code that initiates the boot sequence. From what you've described, we think the malware probably left the partition table intact but damaged the code that initiates the boot sequence. If this turns out to be the case, it's an incredibly easy fix.



```
Type EXIT to quit the Recovery Console and restart the computer.

1: C:\WINDOWS

Which Windows installation would you like to log onto
<To cancel, press ENTER>? 1
Type the Administrator password:
C:\WINDOWS>fixmbr

** CAUTION **

This computer appears to have a non-standard or invalid master
boot record.

FIXMBR may damage your partition tables if you
proceed.

This could cause all the partitions on the current hard disk
to become inaccessible.

If you are not having problems accessing your drive,
do not continue.

Are you sure you want to write a new MBR? y
Writing new master boot record on physical drive
\Device\Harddisk0\Partition0.

The new master boot record has been successfully written.

C:\WINDOWS>
```

If your system won't boot (due to malware infestation) and you've checked your BIOS, try repairing your MBR (master boot record) via the Windows Recovery Console.

If you search the Internet for articles that explain how to repair the MBR on a hard drive, you will come up with thousands of references. In addition, there are a number of third-party utilities available that can take care of the problem for you, but you already have all of the tools you need. Boot to your WinXP CD, and at the Setup screen press *R* to start the Recovery Console. At the command prompt, type **1**, press ENTER, type your administrator password (if you created one), and press ENTER again. Once the Recovery Console is open, type **fixmbr** at the command line and press ENTER. After the Caution statement, type **Y** to repair your drive's MBR. The entire process will take no more than a second or two. Once the repair is done, boot to the WinXP CD again and try installing the OS.

(*NOTE: If you have a similar problem but don't have a bootable Windows CD handy, you can also repair the MBR using the good ol' FDISK utility available on almost any DOS or Win95/98/Me bootable floppy. After booting to the floppy, at the DOS prompt type* **fdisk /mbr**, *press ENTER, and FDISK will repair the active hard drive's MBR.*)

Gasolineburp asked: I was in a local shop today looking at two Intel-based notebooks with about the same specs except the FSB of one notebook was 533MHz while the other was 667MHz. This is only a 33MHz base FSB difference that I didn't think was much (though I realize you have to multiply it by four for the final bus speed difference of 133MHz). I went for the former machine because it was less expensive. Is there a real difference in performance between the two notebooks? We're only talking about bus speed here, right?

A: Well, not exactly, Gas ol' buddy. Most likely, you were checking out an older machine based on the Intel Core Duo mobile processor compared to a newer machine with the Intel Core 2 Duo mobile processor. Core Duo mobile is based the Intel Yonah CPU core architecture and Core 2 Duo mobile is based on Intel's Merom CPU core architecture. For starters, yes, Core 2 Duo runs on a 667MHz system bus and the older Core Duo chip runs at 533MHz. With Intel's QDR (quad data rate) architecture, this actually equates to 133MHz total, though you are correct that the base FSB clock is only turned up from 133MHz to 166MHz to run at a "quad-pumped" 667MHz speed. The differences between the two chips go on from there, however.

Intel's Merom mobile CPU core is more than just an integration effort like its previous Yonah chip was. With Core 2 Duo mobile, you get a full 4MB of "unified" shared cache on the die compared to the smaller 2MB (1MB per core) discrete cache that you find on Core Duo mobile chips. In addition, Core 2 Duo Merom-based processors also support 64-bit extensions for 64-bit operating systems and SSE3 instructions for multimedia and gaming. Along with other core enhancements and advances, Core 2 Duo mobile Merom processors are four-issue capable, meaning they can process up to four instructions (fetch, execute, decode, or retire) vs. Core Duo/Yonah's three-issue core. Finally, of course, there are Merom's power efficiencies and deeper sleep state capabilities that allow even better battery life for notebooks with it. All told, the bus speed differences you noticed were only the tip of the iceberg when it comes to the capability of the processors under the hood of those two notebooks you considered. If you still can, we would say go back to the shop to get the 667MHz Core 2 Duo notebook. ▲

by Dave Altavilla and Marco Chiappetta,
the experts over at HotHardware.com

“Why is Antec The Power of Me?”

Neo HE
430W/500W/550W

Because it gives me the power to be at the top of modern games!

“Whether it’s their P180B mid tower case optimized for cooling or NeoHE 550 power supply feeding my video cards I know I have the Power. This Power is the reason why I am at the top of all modern games, having the right hardware makes all the difference in games. I trust my Antec parts 110% and know that they will never fail me. Running cool and giving me the power to dominate is why I choose Antec!!!”

Tom Moyer
Salem, OR USA

Antec
The Power of You

Image from the game **City Life: World Edition** used with permission of **CDV Software Entertainment USA**

3D Flash Memory

Stacking Layers Of Silicon On Chips

When architects designing buildings begin running out of real estate, they go in a new direction: vertical. With skyscrapers, architects can squeeze more space into a limited area. If you apply this concept to flash memory research and development, you end up with the design idea that Samsung announced in December 2006: rewriteable 3D flash memory. Samsung's CEO and President, Dr. Chang-Gyu Hwang, announced that 3D technologies would be key for advances in flash memory in the next several years. 3D could prevent the physical "dead end" where manufacturers can't make the flash memory silicon transistors smaller because of physical limitations and corrupted data from electron leakage. And at this point, which may occur around 2010, researchers will need newer technologies to continue making improvements in the performance of flash memory. "That's why companies are already examining alternative memory architectures," says Joe Unsworth, a principal research analyst at Gartner. "Companies are looking at other solutions because they have to. When you start moving past the 30nm, the 22nm level is where, at a physics level, you run into a problem. Companies have to come up with creative solutions."

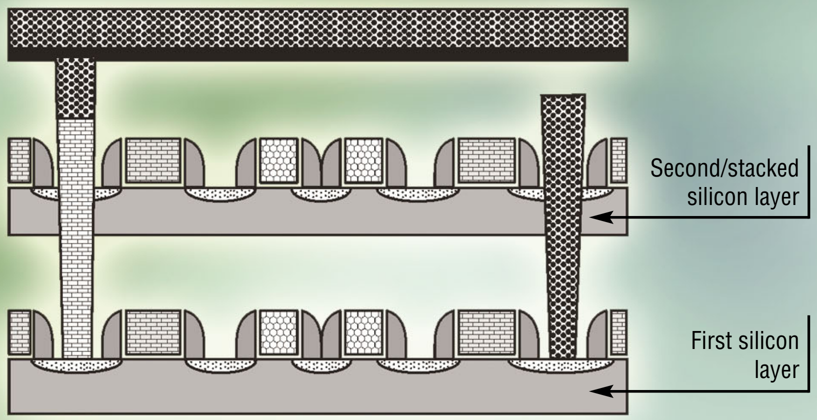
3D Silicon Solutions

By using multiple layers in silicon, Samsung's researchers can add data capacity without increasing the footprint of the overall chip. During his presentation, Dr. Hwang predicted that Samsung's work in 3D will be part of a highly significant shift in the flash memory market during the next several years. "This historic new frontier will change the way we develop and harness semiconductor technologies in substantially improving the level of day-to-day convenience for consumers," Dr. Hwang told those attending the presentation at the 2006 International Electron Devices Meeting.

Samsung researchers say they eventually can build 1Tb flash memory chips that will contain eight layers of silicon. However, the prototype that Samsung announced in December has a capacity of only 32 bits with two layers on a 63nm manufacturing process, meaning the research has a long way to go. (Because the 3D memory chip is still a prototype, Samsung officials wouldn't provide additional information or comment further for this story.)

Stacking NAND chips, another type of 3D memory technology from Samsung, should have a more immediate

Samsung's 3D Flash Memory Prototype



This illustration shows the basic technology behind Samsung's 3D flash memory cell. To build this prototype, Samsung researchers used a common wafer (BEOL [back end of the line] dielectric) for the cells in the first silicon layer. They then grew the thin, second silicon layer on top of the BEOL dielectric. (Researchers built the second layer using SOI-like single-crystal silicon.) Finally, they placed CSLs (common source lines) vertically through the two layers, connecting them to the bit line.

In its prototype, Samsung constructed the wire interconnects while fabricating the second layer, which eliminates a potentially costly additional step of adding interconnects later. The CSL and the bit line appear as part of the creation of the second layer.

Each layer in the 3D stack contains an SSL (string select line) and a GSL (ground select line). By adding grounding to the second layer, Samsung researchers could give it speed that was about equal to the first layer. Without the grounding, the second layer would be much slower in data storage and erasing than the first layer.

You can think of this 3D-stacked architecture like an office building. If the building has only one layer, it needs a minimum number of supports for the roof, leaving a maximized amount of floor space. As architects begin adding layers to the building, though, they have to sacrifice some of the usable floor space for stairs, elevators, and support columns. The same thing happens with stacked silicon layers. Researchers must sacrifice some of the space available for transistors for items such as lines, connectors, and wiring to support the upper layers, meaning there isn't exactly double the number of memory cells in a two-layer 3D memory cell vs. a single-layer memory cell. Still, the 3D chip will provide a significant increase in memory cells. ▲

Sources: SolidState Technology and Samsung impact. In mid-2006, Samsung revealed a prototype memory stacking technology (WSP [wafer-level processed stack package] TSV [through silicon via] interconnects), resulting in chip stacks that are thinner, have a smaller footprint, and use less electrical power than current MCPs (multichip packages). (See the "WSP With TSV Technology" sidebar below for more information.)

Other 3D Flash Ideas

A potential roadblock for Samsung's 3D flash memory is the continued research of other types of nonvolatile memory designed to replace flash memory. Although these types of memory differ technologically from flash memory, several companies are actively researching them.

MRAM (Magnetic RAM). Rather than storing data on the memory chip using an electrical charge or current, MRAM stores data using a magnetic charge. MRAM conserves power better than other forms of memory because it doesn't need a constant refresh. (We discussed MRAM in the November 2006 issue of *CPU* on page 46.)

PRAM (Phase-change RAM). Changing data stored in PRAM involves applying heat to chalcogenide glass, which switches the glass between the crystalline state and the amorphous state. PRAM has shown a high density in prototypes.

Working In 3D

Samsung focused its research on 3D because the company wants to minimize changes the manufacturing process requires to create the new technology. By using stacking layers of silicon to create the 3D memory chips, Samsung can maintain many of its current manufacturing technologies for flash memory, which should minimize research and manufacturing costs.

Because it's still early in the development process, Samsung may yet experience problems with its 3D flash memory, though. "First, what's the performance going to be?" Unsworth says. "I think inherently it will have a performance hit. Second, what will the volume production be like? Can it be made cost-effective?"

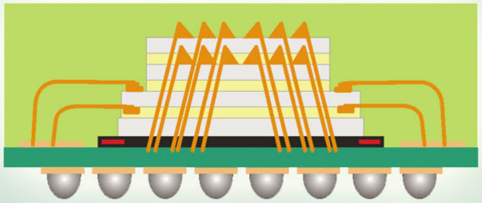
Also, it's still unclear how other patented technologies will affect Samsung's technologies. For example, in 2004, Matrix Semiconductor (now part of SanDisk) introduced a 3D type of flash memory that was a write-once, multiple-read memory chip. Even though Samsung's prototype is a flash memory chip that is rewriteable, until more is known about Samsung's technologies, Matrix's patents could affect some of those technologies, Unsworth says.

Even with the unknowns, Unsworth says he expects Samsung's 3D memory chips to successfully reach the market in the future. "I think it will have an impact; they already have a working prototype," he says. "It'll probably end up at first in a niche application, such as EEPROM (Electronically Erasable Programmable ROM)." ▲

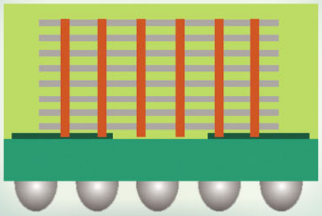
by Kyle Schurman

WSP With TSV Technology

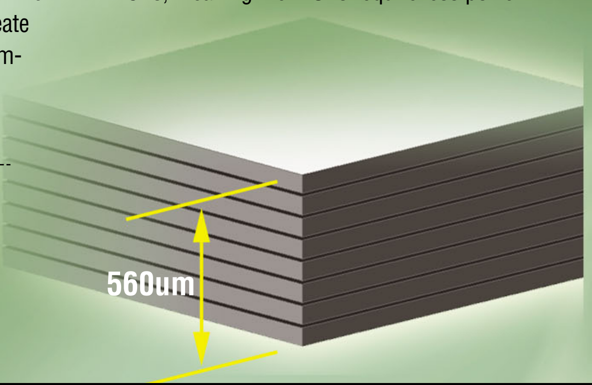
With Samsung's TSV (through silicon via) interconnection technology, the company's WSP (wafer-level processed stack package) memory chips are shorter and have a smaller footprint than traditional MCPs (multichip packages). Samsung introduced WSPs featuring TSV in mid-2006 with a prototype 16Gb stack (eight 2Gb NAND chips), and the company expects the technology to begin appearing in NAND flash chips in the first half of this year. In the future, WSP with TSV technology also could appear in processors and DRAM for servers.



Traditionally, MCPs use wire bonding (orange wires). Using wire bonding requires gaps between the dies; gaps that are double or more the size of gaps in WSP with TSV. As you can see, the MCP footprint must be much larger than the square footage of the die to accommodate the wire bonding.



Using WSP with TSV, Samsung designers could create holes vertically through the stack (red lines), using those holes to directly connect the circuits. The developers used a laser to create the holes, which are about 1 micron in diameter. With TSV, developers needed less space between dies. As you can see from this graphic, the interconnects in a WSP with TSV stack are much shorter than with traditional MCPs, meaning the WSPs require less power.



This magnified photograph of Samsung's prototype WSP with TSV stack of eight chips shows the small gaps between each chip. Each chip measures about 50 microns in thickness, and the total WSP stack package measures about 560 microns (0.56mm) in thickness, which is about 30% thinner than an eight-chip stack using MCP. The WSP with TSV stack also requires a footprint about 15% less than an MCP stack. ▲

Sources: Yole Developpement and Samsung

DisplayPort

Another Video Interface Enters The Digital Display Standard Battle

With some new technologies, it is easy to see that they fill a pressing need and will be instantly successful. Still others won't make a market impact because they're too similar to already available technologies. But with so many new technologies emerging every day, it's tough to know ahead of time what type of impact they will have. For instance, the newest digital video interface, called DisplayPort, fits into the latter group. DisplayPort offers a digital display/video standard that somewhat resembles already available standards (DVI and HDMI), which may limit its appeal. However, DisplayPort has the backing of several large tech companies (such as AMD/ATI, Dell, Intel, and Nvidia, to mention a few), which may give it the support it needs to become a successful standard.

The Warm Up: A Video Interface Refresher

Video interfaces provide the means for moving display data from the source device to the display device. Newer video interfaces provide improved speed and data capacities, meeting the needs of HD video. However, each new video interface carries its own specifications and connectors, and the interfaces usually aren't directly compatible (without the use of an adaptor).

DVI (digital video interface). Intel supported DVI in the late 1990s with the formation of the DDWG (Digital Display Working Group), which helped the interface emerge from a group of competing video interfaces, such as P&D (plug & display) and DFP (digital flat panel), at the time. DVI never achieved the market success analysts expected, possibly because it was ahead of its time. Also, at the time of DVI's introduction most users had VGA-only computer displays, and graphics card

Dissecting DisplayPort

A DisplayPort connection consists of three key components in the physical layer: the Main Link, the AUX CH (Auxiliary Channel), and the HPD (Hot Plug Detect) signal line.

1 The HPD only carries data in one direction, from the Sink device to the Source device. When the user connects devices using DisplayPort, the HPD signals the initiation of the exchange of data. (Also, when the Sink device needs to make an interrupt request to the Source device, it uses the HPD signal line.)

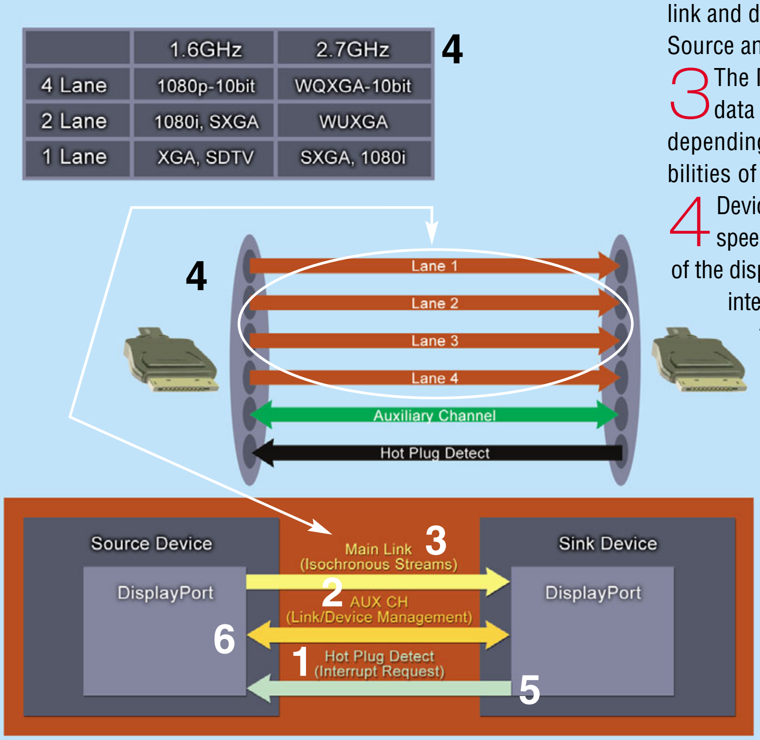
2 The AUX CH offers bi-directional data signals with a 1Mbps data rate, and data sent over it is involved in managing the link and device control. The initial "handshake" between the Source and Sink devices takes place via the AUX CH.

3 The Main Link lanes (or differential/data pairs) can carry data at speeds of either 1.62Gbps or 2.7Gbps per lane, depending on the quality of the connecting cable and the capabilities of the Source and Sink (receiving) devices.

4 Devices can use one, two, or four lanes. The transmission speeds and the number of lanes in use depend on the needs of the display. The Main Link lanes allow for direct drive LCD panel integration, which should lower the cost of entry LCDs. (See the "Direct Drive Monitors" sidebar for more information.) The Main Link can carry data in only one direction, from Source to Sink. It also supports an optional DPCP (DisplayPort Content Protection) system for viewing HDTV, video, and other protected content.

5 If there are any problems, such as a loss of synchronization, the Sink device can notify the Source device through the HPD by sending an interrupt request.

6 When errors occur, the Source device checks the validity and status of the link through the AUX CH. The Source device also makes any corrections through the AUX CH. ▲



	1.6GHz	2.7GHz
4 Lane	1080p-10bit	WQXGA-10bit
2 Lane	1080i, SXGA	WUXGA
1 Lane	XGA, SDTV	SXGA, 1080i

Source: VESA

manufacturers couldn't afford to eliminate support for VGA on their cards in favor of DVI. With VGA still in use almost 10 years later, DVI has never dominated the market and now HDMI and DisplayPort are surpassing it technologically.

HDMI (high-definition multimedia interface). In 2002, the HDMI founders released a new video interface for the consumer electronics market called HDMI. CE manufacturers were looking for a smaller connection option, so HDMI connectors, which were less bulky compared to DVI connectors, became the answer. HDMI also lets users transmit both audio and video through a single cable.

DisplayPort Enters The Ring

Now with HDMI serving as a primary option in the CE market, those who support DisplayPort say a new interface option for computing is necessary. A few of the companies backing DisplayPort helped develop the technology behind it and brought it to the VESA (Video Electronics Standards Association) to create the specification.

"DisplayPort does sound great," says Tom Mainelli, a senior research analyst for displays and projectors for IDC. "They have some interesting technologies that are different from HDMI, but it's still a spec. Nobody's running it yet."

Others say many of the tech companies that are backing DisplayPort want a video interface that doesn't require the payment of royalties, like DVI and HDMI do.

The Main Event: DisplayPort vs. HDMI, DVI & VGA?

Because they are the most similar specifications, it would seem as if DisplayPort and HDMI will become direct competitors. However, Bob Myers, chairman of VESA's board, says DisplayPort's supporters are more concerned with VGA and DVI, which are part of the computing market. "Nobody's expecting VGA to go away tomorrow, but it's clearly not going to last forever," says Myers, who is also a distinguished technologist at HP. "[HDMI] is not best for the computing industry. We have VGA and DVI, but neither can last forever. We needed something new."

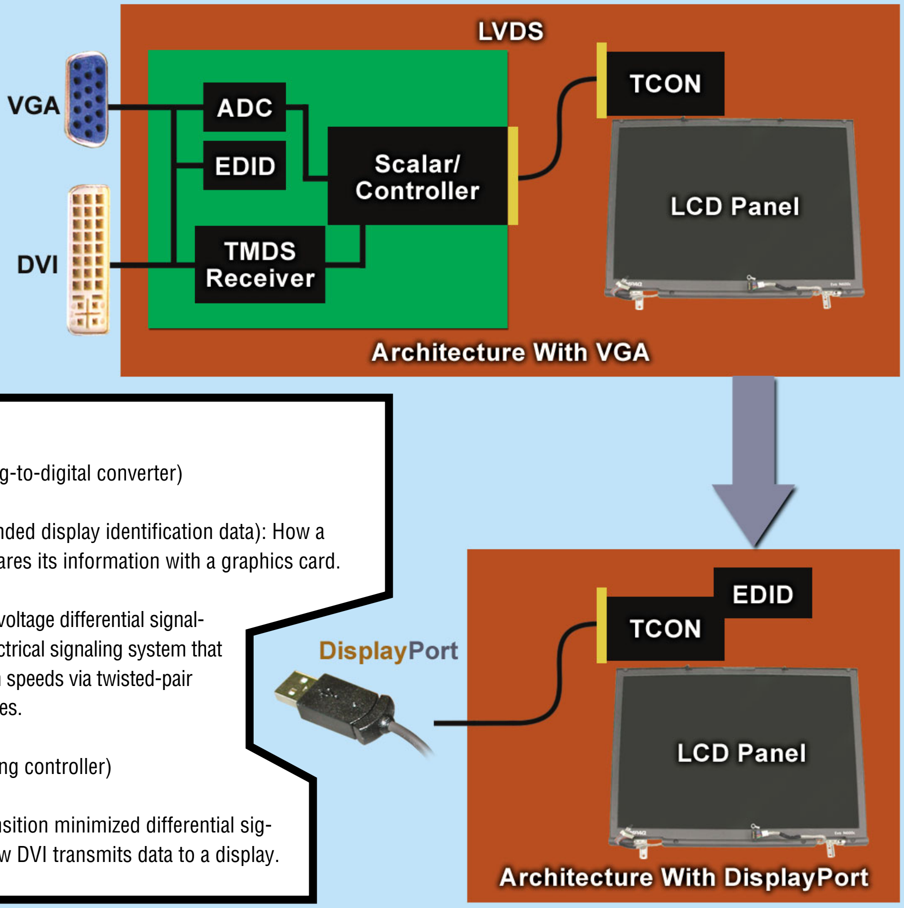
VESA's primary reason for introducing DisplayPort is to simplify high-end graphics for computer users and manufacturers. Users would be able to use DisplayPort to connect their computers to almost any type of video output device, either directly or with an adapter. (DisplayPort will also use adapters to work with DVI and HDMI connectors.) And if PC and display manufacturers can simplify their products by including fewer connectors and less wiring, this should lower the price for those products.

However, this idea of simplification through adoption of DisplayPort doesn't

Direct Drive Monitors

The idea of a "direct drive" monitor is one of the biggest benefits of DisplayPort, according to supporters. VESA says that by implementing DisplayPort into LCD panels, manufacturers can use fewer components in their LCD monitors, making them less complex and dropping their overall cost.

Computer monitors typically must contain a large amount of electronics to handle various tasks, such as framerate and analog-to-digital conversion. And, through DisplayPort the manufacturer could directly connect the computer video interface to the LCD panel; no additional electronics would be necessary. The computer's graphics system must perform all image scaling and conversions. "With a direct drive monitor, there is no need for scalar or front-end electronics," says VESA chairman Bob Myers, "it simplifies the monitor's design." ▲



KEY

ADC (analog-to-digital converter)

EDID (extended display identification data): How a monitor shares its information with a graphics card.

LVDS (low voltage differential signaling): An electrical signaling system that runs at high speeds via twisted-pair copper cables.

TCON (timing controller)

TMDS (transition minimized differential signaling): How DVI transmits data to a display.

Source: VESA

resonate with everyone. Mainelli says adding another digital display standard to the market will almost certainly confuse users even more. "HDMI is starting to get some traction," Mainelli says. "People know what it is. It makes sense. Then they're coming along with another standard. There's going to be confusion for consumers."

Although DisplayPort's primary market is computers and HDMI's main market is consumer electronics, overlap is inevitable. Companies such as Dell that primarily make computers also have begun making big-screen, high-def TVs. And HDMI is beginning to appear on computing devices.

"We're not competing with HDMI," Myers says. "DisplayPort was created to meet the needs of the PC industry. If CE applications want to use it, there's nothing stopping them, but it's primarily a display connection for the PC." ▲

by Kyle Schurman

An Outlook For DisplayPort Adoption

Tom Mainelli, a senior research analyst for displays and projectors for IDC, says IDC's projections show DisplayPort and HDMI eventually will split the computing market. "HDMI is definitely off to a stronger start with 60 million TVs already shipped," he says. "But it's in just a handful of PCs and graphics cards. HDMI will be in more PC products this year."

IDC sees DisplayPort products reaching the market in early 2008, and it probably will see its biggest market share with business-level and commercial desktop computers. "Because of the support of Dell and other big companies like HP, in time DisplayPort will get traction, too," Mainelli says. "In a few years, we will probably see both standards with good footholds in their areas."

If this is the case, be prepared for confusion to reign. Users might experience problems figuring out which cables they need and making different components work together. "Our biggest concern is we'll need another port," Mainelli says. "And to make DisplayPort work with HDMI, it will need an adapter, and that costs more." ▲

IDC Projections For 2010

Commercial Desktop Computers

DisplayPort: 42% (of market)

HDMI: 30%

Consumer Desktop Computers

HDMI: 46%

DisplayPort: 21%

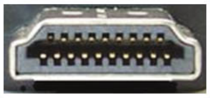
A Brief Comparison Of Video Interfaces

DisplayPort, DVI, and HDMI are comparable video interfaces, each offering different strengths and weaknesses. The connectors for each interface are different, but VESA says its standard will include the ability to create adapters for converting DVI to DisplayPort and HDMI to DisplayPort. (For even further comparison see the examples of the VGA and S-Video connectors.) ▲

	DisplayPort	DVI	HDMI
Analog support	None	Yes, optional	None
Data pairs	1, 2, or 4	3 or 6	3 or 6
Clock	Embedded	Separate pair	Separate pair
Bit rate	1.62Gbps, 2.7Gbps	1.65Gbps	1.65Gbps
Total raw capacity	1.6 to 10.8Gbps	4.95 to 9.9Gbps	4.95 to 9.9Gbps
Audio support	Full support	None	Optional
Content protection	Philips or HDCP,	HDCP, optional	HDCP, optional
Controlling authority	VESA (Video Electronics Standards Association)	DDWG (Digital Display Working Group)	HDMI Licensing and promoter companies

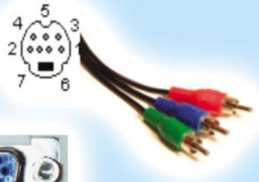
DisplayPort

DVI

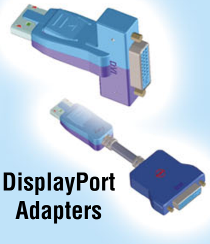


HDMI

S-Video



VGA

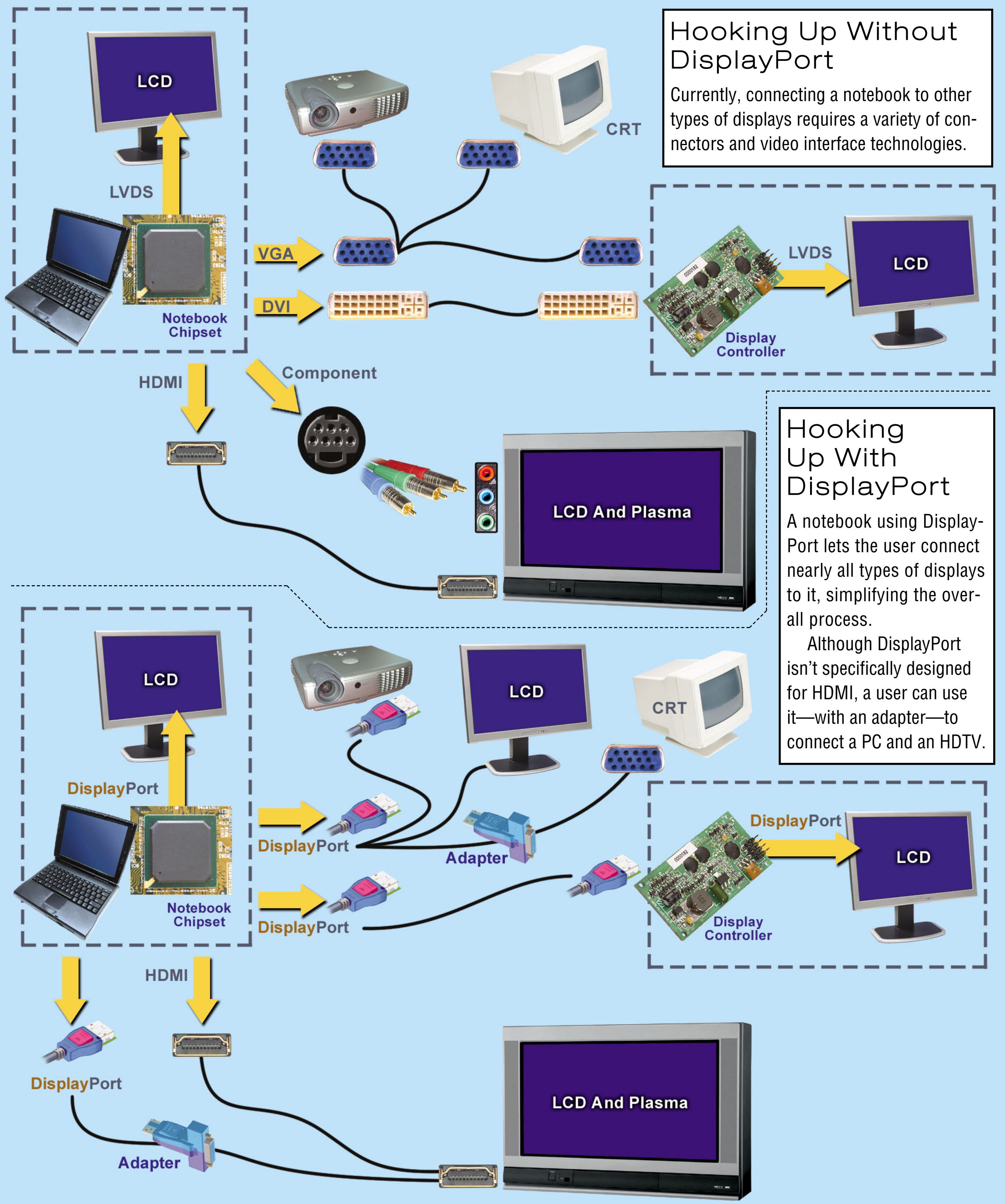


DisplayPort Adapters

Source: VESA

One Connector To Connect It All

The idea behind DisplayPort is to give PC users one connector—with the occasional need for an adapter—to make a connection between a computer and any digital display. ▲



Hooking Up Without DisplayPort

Currently, connecting a notebook to other types of displays requires a variety of connectors and video interface technologies.

Hooking Up With DisplayPort

A notebook using DisplayPort lets the user connect nearly all types of displays to it, simplifying the overall process.

Although DisplayPort isn't specifically designed for HDMI, a user can use it—with an adapter—to connect a PC and an HDTV.

Source: VESA

DE-PIG YOUR RIG

OPTIMIZE & MAXIMIZE

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00101 11010010101 0110101000101 11101010 110 1010100101010 11000101000101000100101l
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Free as in free money, a free lunch, a free beverage of your choice. You wouldn't leave a dollar bill lying on the sidewalk. You take advantage of rebates when you trust the company offering them. You're even starting to realize just how cool the phrase "tax break" really is.

Mind you, we're not implying that you're plunging into coupon clipping like your great-aunt with all the cats, but we do understand that when there's something worthwhile to be gained for your efforts, you'll do it. Like a computer power user.

If you just build a system, turn it on, and start using it as is, you're leaving performance on the table. That PC will not be as fast as it could be until you take a little time to change some of its settings. You've already bought all of the components—making your hardware and software sing won't cost you another dime. This month's two Spotlight articles will help you do what it takes to unearth the hidden speed and responsiveness waiting inside your case.

First, we'll give power users the software information they crave. Seven pages of tips and tricks await the advanced user, with a particular focus on Windows and application tweaks. It all starts with the OS, and rare is the Microsoft fan who won't admit that Redmond's operating system needs a little help to run its best. To put it mildly, there are skajillions of major and minor ways to trim the fat and streamline the waistline, from Registry tweaks to buried settings. As for applications, we take a look at ways to make Internet Explorer 7, Firefox 2.0, and iTunes sizzle. And for those of you with long memories, know that we've done our best to avoid overlap with our performance guides from previous years.

The second act of our Spotlight is devoted to our latest comprehensive overclocking guide, which we've endeavored to aim toward users of all skill levels. We start off with some theory and some explanations of terms to help bring every reader on board, but we soon get deep into the nuts and bolts of OCing processors, RAM, and graphics cards. From identifying overclockable parts to digging up the relevant settings, from heat management to warranty concerns, there's something for everyone. We're not ashamed to admit that we learned a few new things along the way. You've asked for more detail on overclocking, and in this issue's Spotlight, *CPU* delivers.

Of course, there's a downside to jumping feetfirst into tweaking. For one thing, it takes time. Not all of us have a few hours to spend on implementing OS tricks and dialing in memory timings. On the other hand, you can hit the highlights in a matter of minutes or whenever you get a spare moment. If your efforts net you an *X*% faster computer, it won't take long for the cumulative time savings to give you a positive return on your investment.

For another thing, tweaking requires a reasonable amount of care. For example, certain Registry hacks can cause you immediate grief if you don't do them properly.

Of course, overclocking obviously pushes your machine that much closer to the limits of its stability, meaning that there's less cushion between its performance and the edge of its operational parameters. This condition may make itself felt later on when the situation changes, such as when you add another device or the weather turns. A killer OC that's totally stable in April may cause crashes and eventual disk errors in July.

Unless you like riding the edge, and don't mind tumbling off it occasionally, play it safe. Once you find the limits of your system's stability, back off the tweaked settings a couple of notches. After all, you can brag about the benchmarks you charted, but you don't necessarily have to live with those ultra-goosed settings day in and day out. A conservative overclock means more uptime in which you can enjoy using your PC and less time spent troubleshooting an erratic system.

But enough preamble. It's time to get your hands dirty and realize some performance gains. For free. ▲

by Marty Sems

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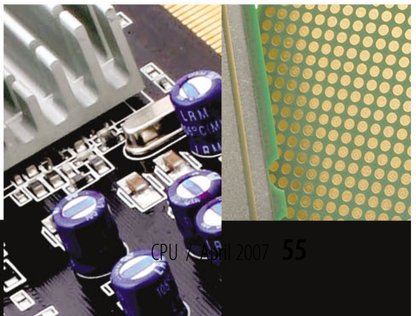
SOFT MODS
KICK YOUR OS & APPS INTO OVERDRIVE

I WANNA GO FAST
OVERCLOCK YOUR PC FOR TOP PERFORMANCE



SOFT MODS

KICK YOUR OS & APPS INTO OVERDRIVE

If the early reviews of Windows Vista tell us anything, it's that many people will continue using Windows XP for a very long time. As such, now may be the best time to review some of the very best tips, tweaks, and utilities that keep WinXP running at peak efficiency, along with some of the most popular Windows applications, such as Word, iTunes, Internet Explorer, and Firefox.

These tips are squarely aimed at power users, so we'll be working directly with the Registry and infrequently used Preferences screens at times. We'll avoid beginner's tips, so check out our Web site to cover the basics. Also, be sure to check out our "Backup! Backup! Backup!" sidebar before proceeding.

Speed Up Windows

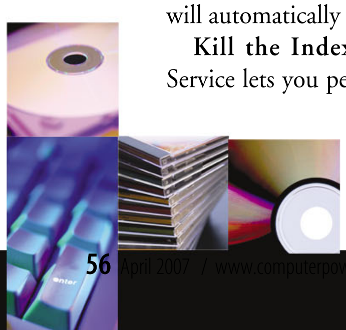
Who wouldn't want a faster Windows? Better yet, you can apply any of these tweaks independently from any of the others.

Reset the Icon Cache. If you're experiencing a stutter or lag as you browse through your Start menu (which can become huge over the years), or your Desktop icons disappear and reappear regularly, your Icon Cache might be corrupted and/or filled with old icons. Refresh the Icon Cache by deleting the IconCache.db file from your profile directory (usually C:/Documents and Settings/Username/Local Settings/Application Data). WinXP will automatically re-create it.

Kill the Indexing Service. The Windows Indexing Service lets you perform "advanced searches" on local directories and network stores, which sounds good in theory. In practice, the process of indexing files seems to occur at the worst moments, and the searches it performs aren't nearly as good as similar tools, such as Google Desktop or Copernic Desktop Search (both free). You can disable it from the Services window; click Start and Run, type **services.msc**, and press ENTER. Right-click Indexing Service, click Properties, and set Startup Type to Manual. Remove it permanently by opening Add/Remove Programs, clicking the Add/Remove Windows Components button, and unchecking Indexing Service.

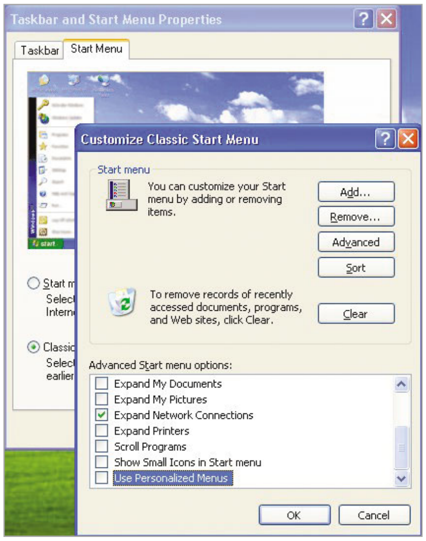
Speed up all Explorer windows. When you open My Computer or an Explorer window, you may notice all your icons first appear as generic Windows icons before slowly filling in. You could also see the "wagging magnifying glass" icon appear before anything else. This is Windows automatically searching for network printers and stores. If you aren't on a LAN or would prefer to manually search for network resources, stop the automated process by opening My Computer and clicking Folder Options from the Tools menu. Click the View tab and uncheck Automatically Search For Network Folders And Printers.

Speed up Explorer's Detailed View. Explorer's Detailed View (choose Details from the View menu) displays information about your files in columns. If you have column headings such as "Pages" or "Bit Rate," then Windows must "peek into" every file to populate those columns, which can take a lot of time. To speed things up, turn off any columns you don't really need to see by right-clicking a column header and unchecking anything you don't want. Click More at the bottom of the pop-up menu in order to see the complete list of available columns.



Make menus appear faster (or slower). You may think Windows works as fast as it can to display menus (including the Start menu). In reality, there's a built-in delay between when you click your mouse and when the menu appears. Reducing or eliminating the delay makes Windows "feel" much faster. After running Regedit, find HKEY_CURRENT_USER\CONTROL PANEL\Desktop\ and select MenuShowDelay. Next, right-click the entry and select Modify and reduce the number to around 100. Experiment to find a number that suits your system and mood. Increase the number to slow menus down.

Speed up folder access by disabling the Last Access Date. Windows updates the time and date a user accessed a file or folder, and, needless to say, because Windows accesses lots of files and folders all the time, updating these stamps can significantly tax your system. If you don't need to know when you (someone else) last accessed a file or folder, you can disable this feature with a Registry edit. Open Regedit and go to HKEY_LOCAL_MACHINE\SYSTEM\CURRENTCONTROLSET\CONTROL\FileSystem. Right-click anywhere in the right pane, point to New, and click DWORD Value. Create a new DWORD Value called NtfsDisableLastAccessUpdate; then right-click it and click Modify from the pop-up menu. Finally, change the Value Data to 1.

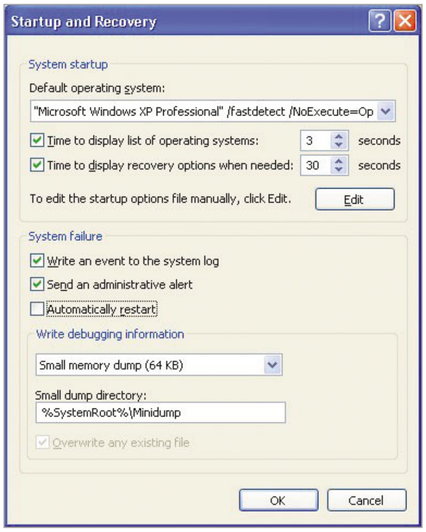


You can customize your Start menu by adding or removing items.

To remove records of recently accessed documents, programs, and Web sites, click Clear.

- ☐ Expand My Documents
- ☐ Expand My Pictures
- ☑ Expand Network Connections
- ☐ Expand Printers
- ☐ Scroll Programs
- ☐ Show Small Icons in Start menu
- ☐ Use Personalized Menus

Speed up a sluggish Start menu by axing personalized folders as one of your options. This only works with the Classic Start menu.



Default operating system: "Microsoft Windows XP Professional" /fastdetect /NoExecute=Op

- ☑ Time to display list of operating systems: 3 seconds
- ☑ Time to display recovery options when needed: 30 seconds

To edit the startup options file manually, click Edit.

- ☑ Write an event to the system log
- ☑ Send an administrative alert
- ☐ Automatically restart

Small memory dump (64 KB)

Small dump directory: %SystemRoot%\Minidump

- ☑ Overwrite any existing file

The Startup And Recovery dialog box offers a couple of useful tweaks to assist with crashed programs and dual-boot systems. Here, you can prevent your system from automatically restarting after a BSOD or hurry through the boot menu if you have two Windows OSes on the same machine.

Reduce CPU usage when selecting AVI files. Similar to the Explorer's Detailed View, when you select an AVI file in Explorer, Windows attempts to determine the file's width and height to properly display it in its Properties dialog box. Unfortunately, if the file is broken or if this information isn't stored in the AVI's header frames, Windows scans the entire AVI file (consuming nearly 100% of the CPU time all the while) looking for the information. And if that AVI file is hundreds of megabytes (or more), then you're in for a long wait. If you can live without this information, tell Windows to stop searching with this Registry edit: Go to HKEY_CLASSES_ROOT\SYSTEMFILEASSOCIATIONS\.AVI\SHELLEX\PropertyHandler. Track down the Default value, which should be {87D62D94-71B3-4b9a-9489-5FE6850DC73E}, and delete it.

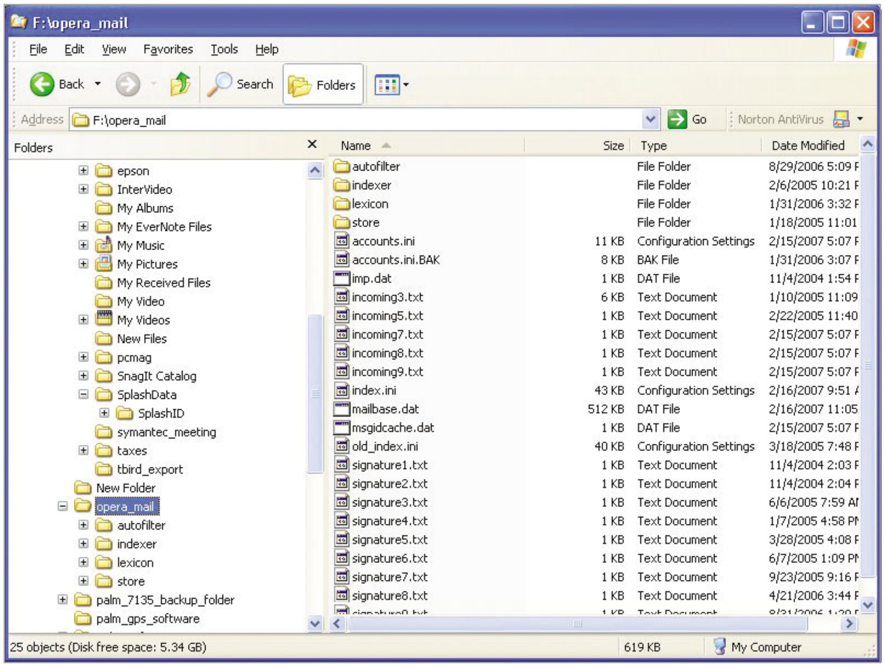
Microsoft has also addressed this issue with a hotfix if you'd prefer to avoid rooting around in the Registry for this specific problem. Open a Web browser and go to support.microsoft.com/kb/822430 for more information.

Speed up shutting down. When you choose to shut down from the Start menu, Windows attempts to close any open programs and windows. Although this usually works well, a stubborn program or error condition may leave Windows hanging for a full minute before shutting down (or restarting). By changing four Registry keys, you can speed the process up significantly. After you open Regedit:

- Change HKEY_CURRENT_USER\CONTROL PANEL\DESKTOP\WaitToKillAppTimeout from 20000 to 1000;
- Change HKEY_CURRENT_USER\CONTROL PANEL\DESKTOP\HungAppTimeout from 5000 to 1000;
- Change HKEY_LOCAL_MACHINE\SYSTEM\CURRENTCONTROLSET\CONTROL\WaitToKillServiceTimeout from 20000 to 1000; and
- Change HKEY_USERS\.DEFAULT\CONTROL PANEL\DESKTOP\WaitToKillAppTimeout from 20000 to 1000.

Reloading Registry changes without restarting. If you're experimenting with changes to the Registry, restarting your system every time you want to see changes take effect may become annoying and consume a lot of time. Shutting down Explorer.exe and relaunching it, however, rereads the Registry. There are a lot of ways to do this, but here's our favorite method: First, close any open applications and files. Next, bring up the Windows Task Manager (pressing CTRL-ALT-DELETE is the fastest way), and click the Processes tab. Select Explorer.exe and click End Process. Click Yes to accept the Task Manager Warning if you receive one. (Your Desktop icons should disappear at this point.) Next, click the Task Manager's File pull-down menu and click New Task (Run). Finally, run Explorer; the Desktop icons will return and the Registry changes should be in effect.

Load Windows faster with a static IP address. Most wireless and wired Ethernet cards are, by default, configured to receive an assigned IP address via



Name	Size	Type	Date Modified
autofilter		File Folder	8/29/2006 5:09
indexer		File Folder	2/6/2005 10:21
lexicon		File Folder	1/31/2006 3:32
store		File Folder	1/18/2005 11:01
accounts.ini	11 KB	Configuration Settings	2/15/2007 5:07
accounts.ini.BAK	8 KB	BAK File	1/31/2006 3:07
imp.dat	1 KB	DAT File	11/4/2004 1:54
incoming3.txt	6 KB	Text Document	1/10/2005 11:09
incoming5.txt	1 KB	Text Document	2/22/2005 11:40
incoming7.txt	1 KB	Text Document	2/15/2007 5:07
incoming8.txt	1 KB	Text Document	2/15/2007 5:07
incoming9.txt	1 KB	Text Document	2/15/2007 5:07
index.ini	43 KB	Configuration Settings	2/16/2007 9:51
mailbase.dat	512 KB	DAT File	2/16/2007 11:05
msgidcache.dat	1 KB	DAT File	2/15/2007 5:07
old_index.ini	40 KB	Configuration Settings	3/18/2005 7:48
signature1.txt	1 KB	Text Document	11/4/2004 2:03
signature2.txt	1 KB	Text Document	11/4/2004 2:04
signature3.txt	1 KB	Text Document	6/6/2005 7:59
signature4.txt	1 KB	Text Document	1/7/2005 4:58
signature5.txt	1 KB	Text Document	3/28/2005 4:08
signature6.txt	1 KB	Text Document	6/7/2005 1:09
signature7.txt	1 KB	Text Document	9/23/2005 9:16
signature8.txt	1 KB	Text Document	4/21/2006 3:44

25 objects (Disk free space: 5.34 GB) 619 KB

If Windows is automatically searching for networked folders and printers, it can make icons display dreadfully slow the first time you open My Computer. Disabling this feature can speed things up.

DHCP at boot time. This usually only takes a second or two if your DHCP server is working properly, but if there's ever a problem—the DHCP server is down, a network cable is unplugged, or you have a slow/cheap router—Windows can sit around for a long time, waiting for that IP address.

Most of the time, in a home environment, you'll always have the same IP address assigned to you, so why not cut out the DHCP wait altogether and assign a static IP address to your PC? Assuming you're behind a router, load its configuration utility and note what IP addresses the router is assigning via DHCP. Open Network Connections in the Control Panel, right-click your network card or Local Area Connection, and click Properties. In the dialog box that opens, select Internet Prototol (TCP/IP) and click Properties. Click the Use The Follow IP Address, assign yourself a static IP address (such as 192.168.1.10), and set the DNS server address to the IP address of your router. Reboot and try to access the Internet. If you can't, simply reset your connection to DHCP.

Disable automatic media speed sensing on network cards. Although this doesn't frequently happen, Windows occasionally takes a moment to check the Ethernet speed of your NICs during these times, CPU utilization can zoom to nearly 100%, causing a hiccup. You can stop Windows from checking the connection speed by manually specifying it yourself.

Open System in the Control Panel and click the Hardware tab. Then, click Device Manager. Expand the Network Adapters entry, right-click your NIC, and select Properties from the pop-up menu. In the dialog box that opens, click the Advanced tab and choose Link Speed & Duplex, select the speed of your LAN (for example, 100Mbps/Full Duplex) from the Value drop-down menu.

Convert FAT32 volumes to NTFS. Most benchmarks show that NTFS is faster than FAT32, but other NTFS benefits include better security, fewer fragmentation issues, and general stability improvements. Although any new system that came with WinXP almost certainly used drives formatted with NTFS, you might still have a FAT32 drive if you upgraded your system from an earlier version of Windows. To make the jump from FAT32 to NTFS, follow these steps:

1. Back up the drive's data.
2. Click Start and Run, type **cmd**, and press ENTER to open a command prompt window.
3. Type **vol c:** and press ENTER to find and note the volume label of partition. (This assumes you're converting the C drive; change the drive letter appropriately here and in step 4.)
4. Type **convert c: /fs:ntfs** and press ENTER.
5. When prompted, enter the volume name you noted in step 3.
6. Answer "y" to the remaining questions. The system will reboot and convert the volume. The first reboot after conversion may take a few minutes longer than usual, but this will only happen once.

Disable redundant 8.3 file names. As long as you're removing vestigial file systems to increase speed, why not remove vestigial file naming conventions? WinXP saves each file with two different file names. One is nice and long and corresponds to what you see in the File Explorer and command prompt. The other still conforms to DOS' old 8.3 convention and, for the most

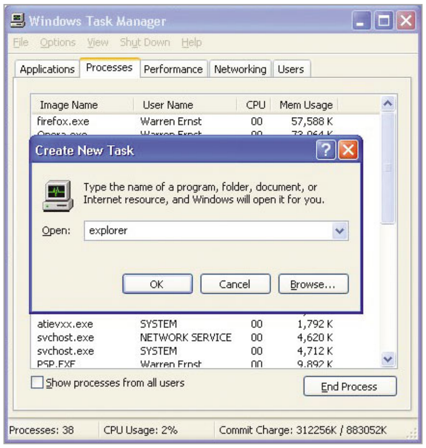


Image Name	User Name	CPU	Mem Usage
firefox.exe	Warren Ernst	00	57,588 K
atievxx.exe	SYSTEM	00	1,792 K
svchost.exe	NETWORK SERVICE	00	4,620 K
svchost.exe	SYSTEM	00	4,712 K

Type the name of a program, folder, document, or Internet resource, and Windows will open it for you.

Open: explorer

☐ Show processes from all users

Processes: 38 CPU Usage: 2% Commit Charge: 312256K / 883052K

Fiddling with the Registry can even be a time-consuming process for an expert if you have to restart after every change. Instead, close Explorer with Windows' Task Manager and restart it to make Registry changes without a full system restart.

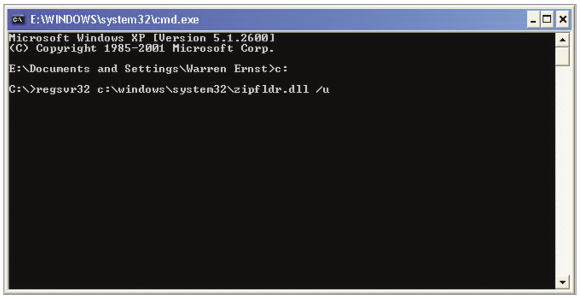
part, stays hidden to everything but old DOS and pre-Win95 programs. You can disable these old filenames and save resources with an easy Registry edit. Set HKEY_LOCAL_MACHINE\SYSTEM\CURRENTCONTROLSET\CONTROL\FILESYSTEM\NtfsDisable8dot3NameCreation to 1 and restart.

Speed searching by disabling ZIP files. The default Windows Search function peeks inside compressed ZIP files, which can take forever. If you don't want Windows to search ZIP files, unregistering a DLL takes care of the problem. In an open a command prompt window, type **regsvr32c:\windows\system32\zipfldr.dll /u** and press ENTER. You can restore this feature by simply rerunning the command without "/u."

Speed up the Classic Start menu. If your Start menu is taking forever to open and you're using WinXP's Classic Start menu, you can dramatically speed it up by disabling Personalization. Right-click the Start button and click Properties from the pop-up menu. Click the Start Menu tab, and, if necessary, the "Classic Start menu" radio button. Then, click the Customize button, scroll down to the bottom of the Advanced Start menu options list, and uncheck Use Personalized Menus. Click OK to dismiss the open dialog boxes.

Speed up dual booting. If you have a second Microsoft OS on your PC, you probably have Microsoft's Boot Menu staring at you for 30 full seconds during each boot, which quickly grows tiresome. You can reduce this time to few seconds. This will speed along the boot process when you want to boot to your default OS but leave plenty of time to select the other OS when necessary.

You can use Notepad to manually change Boot.ini's timeout setting, but there's a less well-known way to use a friendly dialog box to change the timeout with virtually no chance of making a mistake. First, open System in the Control Panel and click the Advanced tab. Then click the Startup And Recovery Settings button. Use the drop-down menu to choose your default operating system and set the Time To Display List Of Operating Systems value to a shorter amount of time that still affords you the opportunity to select the OS you want to boot. Changes take effect with the next boot.

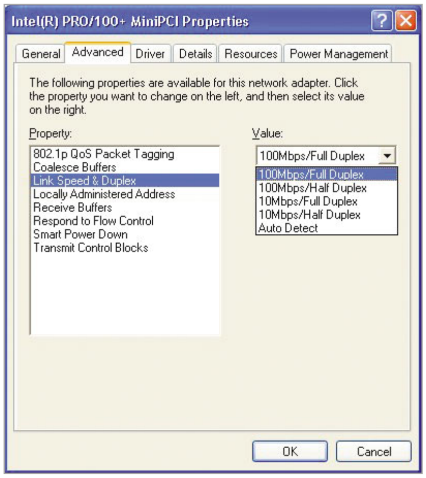


```
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

E:\Documents and Settings\Warren Ernst>c:

C:\>regsvr32 c:\windows\system32\zipfldr.dll /u
```

Window XP's file extraction tool is great if you don't have a program such as WinZip, but it can be a drag if you do. Fortunately, disabling a DLL is all you need to do to clear up the problem.

Use hardware profiles to safely experiment with Windows. Wouldn't it be great to have two (or more) totally different Windows configurations on the same computer? As it turns out, Microsoft envisioned this scenario years ago, although it originally intended hardware profiles for notebook users who had different docking stations connected to different networks. A great use for everyone else is to have different collections of settings (both hardware and software) on the same computer. But first, you need to set the profiles up.

First, open System in the Control Panel and click the Hardware tab. Then, click the Hardware Profiles button. If this is the first time you've ever tinkered around with hardware profiles, you should already have one profile, called either Profile 1 (Current) on a desktop PC or Undocked Profile (Current) if you have a notebook without a docking station; this Profile contains your current settings. Next, click Copy, which creates a duplicate of your current profile, and name it something else (such as Experiments). You may also want to select your current profile, click the Rename button, and name it something like "Original" or "Working." Finally, individually select each Profile and click Properties. From the resulting dialog box, check the Always Include This Profile As An Option When Windows Starts checkbox.



The following properties are available for this network adapter. Click the property you want to change on the left, and then select its value on the right.

Property:
- 802.1p QoS Packet Tagging
- Coalesce Buffers
- Link Speed & Duplex
- Locally Administered Address
- Receive Buffers
- Respond to Flow Control
- Smart Power Down
- Transmit Control Blocks

Value: 100Mbps/Full Duplex
- 100Mbps/Full Duplex
- 100Mbps/Half Duplex
- 10Mbps/Full Duplex
- 10Mbps/Half Duplex
- Auto Detect

If you know your NIC's speed, you can manually set it to prevent Windows from randomly checking during an inopportune moment, causing your CPU usage to dramatically spike.

The next time Windows boots, it will present you with a menu that lists your different profiles. Select one with your keyboard to change hardware settings and enable or disable Windows services; the changes you make in one profile won't affect others.

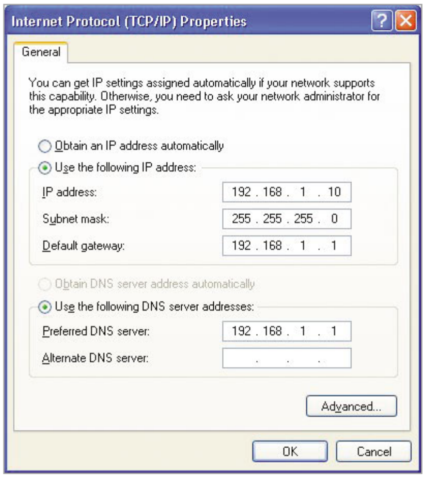
Create a gaming profile to boost frame rates. After reviewing the hardware profiles tip, consider creating a special profile just for gaming. With it, you can disable unused or troublesome hardware, turn off unneeded Windows services, and reduce the number of autostart programs. With a reduced CPU and memory load, you'll have more resources available for your high-end game, which can reduce stutters and pauses. When you're finished fragging folks, reboot and select your "normal" profile, and your bells and whistles will return to their previous state.

Save Windows Resources & Drive Space

Windows dedicates a lot of hard drive space to features that many power users would never use or uses default space calculations that don't make a lot of sense in the era of 500GB hard drives. Changing these settings is relatively simple and saves tons of space.

Reduce Recycle Bin storage space. By default, Windows reserves a whopping 10% of each drive volume for storing files you've deleted. But how often do you really need to recover a 50GB file from the Recycle Bin? To put some of that space back into the general storage pool, right-click the Recycle Bin and choose Properties from the pop-up menu. If you only have one drive (or if you have multiple drives and want them to all have the same setting), just slide the slider to the left until you get the percentage you think is appropriate. (For a 500GB drive, 2%, or 10GB, is not an unreasonable number.) If you have multiple drives and you want a different percentage of space reserved for each drive, click the Configure Drives Independently radio button. Then, click each drive's tab at the top of the dialog box and move the slider for each drive.

Do your own backups and disable System Restore. Windows has its own on-the-fly backup and restore system called System Restore. Although Restore Points can be useful, if you have your own backup system in place, there's no need to tie up all that space with redundant backups you'll never use. Fortunately, you can completely disable System Restore, and, as a bonus, save some CPU and memory resources. To disable System Restore, open System in the Control Panel, click the System Restore tab, and check the Turn Off System Restore checkbox. Reboot for the changes to take effect. To free up the space that System Restore used to use, open Explorer (if necessary, make hidden and system files visible), and delete the System Volume Information folder on each drive.

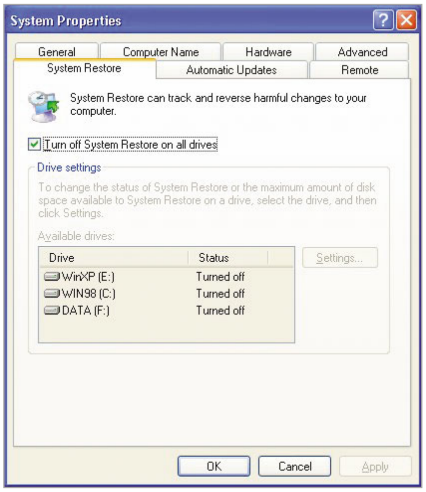


You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

○ Obtain an IP address automatically
● Use the following IP address:
IP address: 192 . 168 . 1 . 10
Subnet mask: 255 . 255 . 255 . 0
Default gateway: 192 . 168 . 1 . 1

○ Obtain DNS server address automatically
● Use the following DNS server addresses:
Preferred DNS server: 192 . 168 . 1 . 1
Alternate DNS server: . . .

Setting a static IP address is another network tweak that can add a boosting to a lagging system.



System Restore can track and reverse harmful changes to your computer.

☑ Turn off System Restore on all drives

Drive settings

To change the status of System Restore or the maximum amount of disk space available to System Restore on a drive, select the drive, and then click Settings.

Available drives:

Drive	Status
WinXP (E:)	Turned off
WIN98 (C:)	Turned off
DATA (F:)	Turned off

System Restore might come in handy if you don't have a dedicated backup utility, but you might as well disable it if you have better options.

Turn off Hibernation options. Do you ever use the Windows Hibernation feature? It's actually pretty neat, storing the entire contents of your RAM in a temporary file before sending your PC into an almost-off, low-power mode. When you wake up your system, it copies the temporary file back into RAM, and you're off and running. Still, if you never use Hibernate, Windows still keeps a hidden file on your hard drive—exactly the same size as your amount of system memory—waiting to dump stuff into it.

If you're not ready for a hard drive upgrade and space is really tight, you can reclaim that wasted space by turning off the Hibernation feature in Windows. Just open Power Options in the Control Panel, click the Hibernate tab, and then uncheck the Enable Hibernation checkbox. When you restart, Windows deletes that hidden file (named Hiberfil.sys, incidentally), and you reclaim your space.

General Windows Tweaks & Problem Solving

These tweaks don't specifically speed up anything in Windows, but they're likely to solve annoying little issues you've lived with for years.

Determine if you need more RAM. There are people who say, "You can't have too much RAM." These people must also say, "You can't have too much money," and have cartloads of it lying around for every PC in the house. The rest of us must find a balance between money and RAM, and that usually means only buying the amount we need.

An easy way to find out how much RAM you really need is to use your system normally without restarting for at least a day. At the end of the day, open the Task Manager (pressing CTRL-ALT-DELETE opens it, for example) and click the Performance tab. Compare the value for "Commit Charge – Peak" to the amount of RAM you have. If the value is higher then your RAM, then you'll see a benefit to installing more memory. If it's less, then you're probably doing just fine, RAM-wise. To be sure, check this value over the course of several days.

Note that if you've manually changed the size of the Paging File, you'll need to adjust it again after adding RAM. If you've told Windows to manage the size of the Paging File automatically, it will still do so after adding RAM.

Disable auto-reboot to help solve problems. When you encounter a significant crash and get a BSOD, WinXP normally displays it for a moment and then reboots the machine. This is probably the right action for an unattended server, but it makes diagnosing the error on a normal workstation/gaming PC rather troublesome. There's not enough time to write down the error, and if the crash occurred while you were away, you might not even realize there was a crash (and restart) to begin with. (Honestly, how often do you really check your error logs?)

To keep the BSOD open indefinitely, open System from the Control Panel and click the Advanced tab. Then click the Settings button under Startup and Recovery Settings and uncheck Automatically Restart in the System Failure section. This will take effect after a restart.

Boost Internet Explorer 7

Love it or leave it, IE is the world's most popular browser, and version 7 introduces new wrinkles that need attention.

Change the default search provider. If you want to change your search provider from, say, MSN to Google, click the down arrow icon next to the magnifying glass in the search field and choose Change Search Defaults. Choose your preferred search engine, click the Set Default button, and then OK.

Add or remove toolbars. IE7's sparse interface, complete with its lack of conventional toolbars, has frustrated a lot of experienced users. Right-clicking any empty area next to the tabs lets you add or remove toolbars, including a conventional menu bar (File, Edit, etc.). Be sure to unlock the toolbars (click View, point to Toolbars, and uncheck Lock The Toolbars) before you try to drag them to your desired locations.

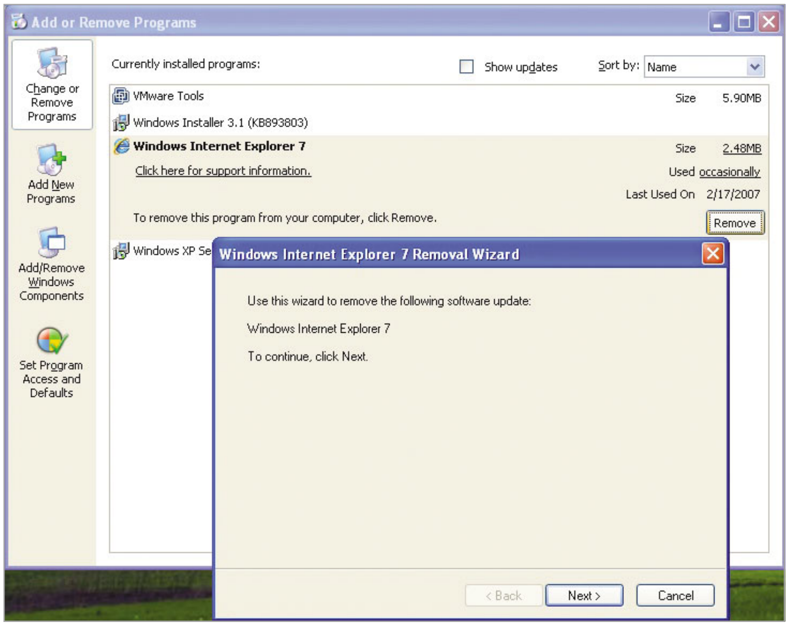
Return to Internet Explorer 6. If you've hung with IE7 for as long as you can and you just don't like it (or if you frequent Web sites that don't play nice with IE7), you can go back to IE6. Just open Add or Remove Programs from the Control Panel and choose Internet Explorer 7. Windows will warn you that this may break certain security patches that you've downloaded after installing IE7, but most of those patches relate to IE7 itself. The process takes longer than you'd think (as does the first reboot afterwards) but in the end, you'll be greeted with the familiar IE6 you've come to know and, um, love.

Boost FireFox 2.0

With all of its extensions and themes, entire books have been written about getting the most from Mozilla Firefox. As such, we'll limit ourselves to just two.

Backup your Firefox "everything." You have probably accumulated a large collection of themes, extensions, bookmarks, and passwords for Firefox. All of these things are gathered together into Mozilla Profiles, which are sometimes susceptible to corruption. A freeware tool, MozBackup (mozbackup.jasnapaka.com), can backup and restore your profiles with just a few clicks and makes the task of moving a Firefox installation from one computer to another a breeze. If you use Thunderbird for email, it also backs up and restores your mailstore.

Speed up browsing. This next set of modifications exemplifies what's possible


Add or Remove Programs
Change or Remove Programs
Add New Programs
Add/Remove Windows Components
Set Program Access and Defaults
Remove
< Back
Next >
Cancel

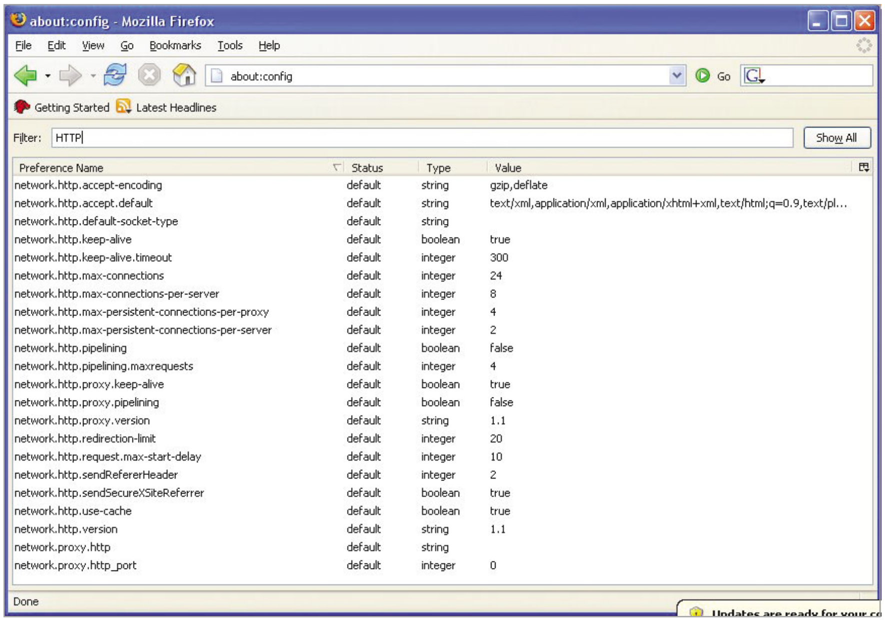
Currently installed programs: ☐ Show updates Sort by: Name

VMware Tools Size 5.90MB
Windows Installer 3.1 (KB893803)
Windows Internet Explorer 7 Size 2.48MB
Click here for support information. Used occasionally
Last Used On 2/17/2007
To remove this program from your computer, click Remove.
Windows XP Se

Windows Internet Explorer 7 Removal Wizard

Use this wizard to remove the following software update:
Windows Internet Explorer 7
To continue, click Next.

Internet Explorer 7 might be the future of Web browsing for Microsoft, but it's far from perfect for everyone. Rolling back to IE 6, that trusty old mare, is fortunately not a difficult task.


about:config - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
about:config
Go
Getting Started
Latest Headlines
Show All
Done
Updates are ready for your co

Filter: HTTP

Preference Name	Status	Type	Value
network.http.accept-encoding	default	string	gzip,deflate
network.http.accept.default	default	string	text/xml,application/xml,application/xhtml+xml,text/html;q=0.9,text/pl...
network.http.default-socket-type	default	string	
network.http.keep-alive	default	boolean	true
network.http.keep-alive.timeout	default	integer	300
network.http.max-connections	default	integer	24
network.http.max-connections-per-server	default	integer	8
network.http.max-persistent-connections-per-proxy	default	integer	4
network.http.max-persistent-connections-per-server	default	integer	2
network.http.pipelining	default	boolean	false
network.http.pipelining.maxrequests	default	integer	4
network.http.proxy.keep-alive	default	boolean	true
network.http.proxy.pipelining	default	boolean	false
network.http.proxy.version	default	string	1.1
network.http.redirection-limit	default	integer	20
network.http.request.max-start-delay	default	integer	10
network.http.sendRefererHeader	default	integer	2
network.http.sendSecureXSiteReferrer	default	boolean	true
network.http.use-cache	default	boolean	true
network.http.version	default	string	1.1
network.proxy.http	default	string	
network.proxy.http_port	default	integer	0

Firefox has a host of configuration options to boost your browsing experience. Just type about:config in its Address Bar to access the goodies.

with Firefox, but it can be controversial. You can set Firefox to use multiple connections to a Web server to retrieve multiple files instead of just one. Some consider this approach as inconsiderate to Webmasters, because their servers must spend more effort serving you a page than someone else. That said, this can boost performance considerably and illustrates how to modify technical settings in Firefox.

First, open Firefox and type **about:config** in the Address Bar and press ENTER, which displays the equivalent of Firefox's Registry. Next, type **HTTP** into the Filter field, which displays only those entries that have "http" within them. Then, do the following:

1. Change network.http.pipelining to true by double-clicking it;
2. Change network.http.pipelining.maxrequests to 8 by double-clicking it and entering 8 in the pop-up window;
3. Change network.http.max-persistant-connections-per-server to 8;
4. Change network.http.max-connections to 48;
5. Change network.http.proxy.pipelining to true;
6. Change network.http.max-persistant-connections-per-proxy to 8; and
7. Right-click anywhere in this screen, and choose New Integer from the pop-up menu. Enter the Preference Name as nglayout.initialpaint.delay, and its Value as 0.

Restart Firefox to enable the changes.

Boost iTunes & iPod

It stands to reason that if the iPod is the world's most popular MP3 player, then iTunes must be pretty darn popular, too. As an Apple product, it doesn't require a ton of internal tweaking, but various third-party utilities add a lot of functionality that Apple either forgot to add or didn't want to. Combined with just a few internal tweaks, iTunes can be almost anything you want it to be.

Import to MP3 for portability. If you have another device capable of playing MP3s, such as a DVD player, car stereo, or another MP3 player, you can have iTunes rip music into MP3 files directly instead of AAC files. Click Preferences from the Edit menu. Then, click the Advanced tab and the Importing subtab. Change the Import Using drop-down menu to MP3 Encoder and set the bit rate to whatever you prefer. Within the Importing subtab, you can also alter the way iTunes names your MP3 files. The raw MP3 files are stored in the iTunes music folder.

Hierarchical playlists. ITunes 7 can organize hundreds of playlists by arranging them into collapsible folders—much the same way the Explorer lists directories—along the left pane. To create one, click File and New Folder. A new folder, named "Untitled Folder" appears, and iTunes selects it by default. Rename it and either drag existing playlists into it or leave the folder selected and click the Create A Playlist button to create a new playlist within that folder. Unfortunately, these folders don't appear within your iPod: All nested playlists appear the same as top-level playlists.

Add album art *en masse*. Although iTunes does a fair job of adding album art to the songs already in your library, a free utility called TuneSleeve (tunesleeve.googlepages.com) does it much better, allowing you to drag-and-drop graphics directly from Web pages into every song in an album at once. If given enough time, it also searches for art on the Internet by itself, assigning artwork to all songs in a playlist or your entire library. It is also able to find alternative artwork or multiple versions of the same album and lets you replace artwork iTunes has already found.

Use Your iPod without iTunes. YamiPod (www.yamipod.com) is a freeware iPod manager and media player that's available for Windows, Mac OS X, and Linux—just copy the executables to your iPod and plug it into whatever computer you have. Yamipod will do the rest of the work for you. With it, you can play music, create playlists, add or extract songs directly from the iPod to your computer, remove duplicate tracks, find "lost" music files, import and export playlists in M3U format, and a lot more. In short, YamiPod lets you use your iPod the way you want to, rather than the way Apple does. ▲

by Warren Ernst

Back up! Back up! Back up!

How much clearer can we be? You really need to have some sort of backup system in place, but this is especially true when you're mucking around with various Windows settings and the Registry itself.

The best backup method is a whole system backup, which copies everything, including Windows, to a second hard drive or set of DVDs. You need to perform these backups outside of Windows, because Windows can't seem to back up open files of itself. Tools such as Norton Ghost and Acronis True Image are ideal. You should really do this right now. We'll wait.

What's that? You can't be bothered with a whole system backup? Then at least make a Windows Restore Point. To create a Restore Point, click Start, All Programs, Accessories, System Tools, and System Restore. Click Create A Restore Point, give it a unique name (such as "Before Tweaking"), and follow the prompts. You can restore your system back to this point at the same screen.

No time for that? Then for heaven's sake, at least back up your Registry. Start Regedit. (Click Start and Run, type **regedit**, and press ENTER.) Then, right-click My Computer and choose Export. Set the Export Range to All and save the file with a name like "Before_tweaking.reg." Then, if something goes wrong, you can restore the Registry by simply double-clicking the backup up Registry file and letting it overwrite the old file. ▲

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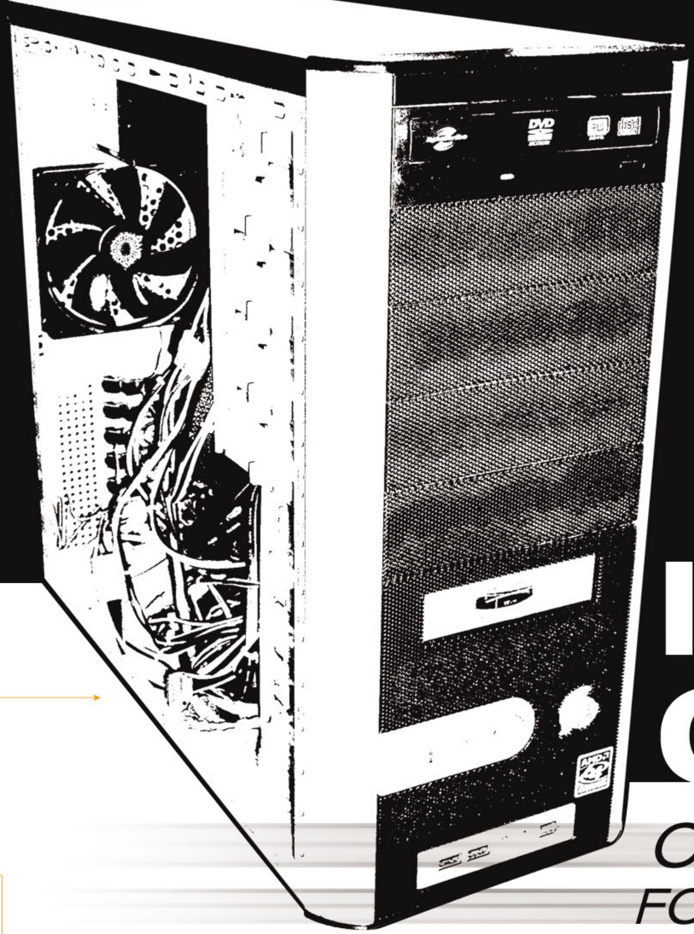


I WANNA GO FAST

OVERCLOCK YOUR PC FOR TOP PERFORMANCE

We talk about overclocking and feature overclocked components on a regular basis here in the pages of *CPU*, but it's not often that we focus on the essence of overclocking and discuss the fundamental techniques necessary to make a component—or group of components—run faster. We've received a considerable number of requests over the years for a detailed tutorial on overclocking, so we'll blend together some beginner-, intermediate-, and expert-level overclocking tips into one easily digestible information resource. What is overclocking? Why do it? How do you tell if you've taken an overclock too far? We'll cover these topics, and that's just the tip of the iceberg.

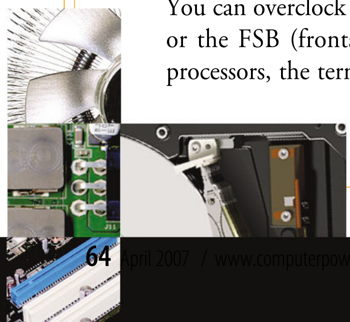
At its most basic level, overclocking is exactly what its name implies—making a component, such as a CPU, memory, or video card run at a clock speed above its rated frequency. If you're willing to accept (and are equipped to handle) the extra heat and increased power consumption that inevitably result from overclocking your components, your reward is a PC that performs better—sometimes much better—than before.

The Basics

So, how do you overclock? There are a multitude of answers. You can overclock a processor by either raising its multiplier or the FSB (frontside bus) frequency. (For current AMD processors, the term FSB technically does not apply because the chips have an on-die memory controller, but the principle is the same.) To determine a desktop processor's ultimate clock speed, simply multiply its multiplier with the FSB. For example, an Intel Core 2 Extreme X6800 has a stock multiplier of 11 and a 266MHz FSB, resulting in a 2.93GHz clock speed. Increasing either variable increases the processor's final frequency; an X6800 with a 13X multiplier will operate at 3.45GHz (13 x 266MHz), obviously faster than 2.93MHz. And a faster processor almost always results in increased performance.

There are also a few different ways to overclock system memory. Memory clock speeds are usually determined by a ratio between the FSB and memory interface speeds or by dividing the FSB speed by a divider that's predetermined in the system BIOS. Using the X6800 processor and an nForce 680i SLI motherboard as examples, we can better explain. Most nForce 680i SLI motherboards offer Auto, 1:1, 5:4, 3:2, Sync Mode, and Unlinked modes to configure memory speeds. Auto mode will typically run the memory at its stock 800MHz while the processor runs with the motherboard's default 1,066MHz FSB. Change the ratio to 1:1, however, and the memory will also run at 1,066MHz; a 5:4 ratio will run the memory at 853MHz, and so on.

Some users also consider memory "overclocked" if it uses latencies lower than its default because it will transfer more data in a given time interval. Memory with 4-4-4-12 timings would be considered overclocked if its stock timings were 5-5-5-12. For example, the CAS latency setting, which the first value represents, is the number of clock cycles that elapse after the memory controller sends a read request but before the data is transmitted. CAS 5 RAM would normally take five cycles, but if it's tweaked to operate at CAS 4, one less clock cycle would tick before the data is transmitted. Despite this, as we've shown in a trio of memory roundups



110 001 101001 001110001 0110 11001 010 0010 11011 10 1101 1101

this past year, raising memory's clock speed to increase the available bandwidth is more effective that reducing its latencies.

Video card overclocking is perhaps the most straightforward. Both Nvidia and ATI have incorporated tools into their drivers that give users the ability to tweak GPU core and memory frequencies. ATI calls its overclocking tool Overdrive; Nvidia has worked the necessary tools into the Performance menu of its most recent ForceWare driver suite. The traditional Coolbits tweak for Nvidia's ForceWare drivers no longer exposes the overclocking components, as it did with older ForceWare releases. Users are now required to install nTune to manually manipulate GPU and memory frequencies.

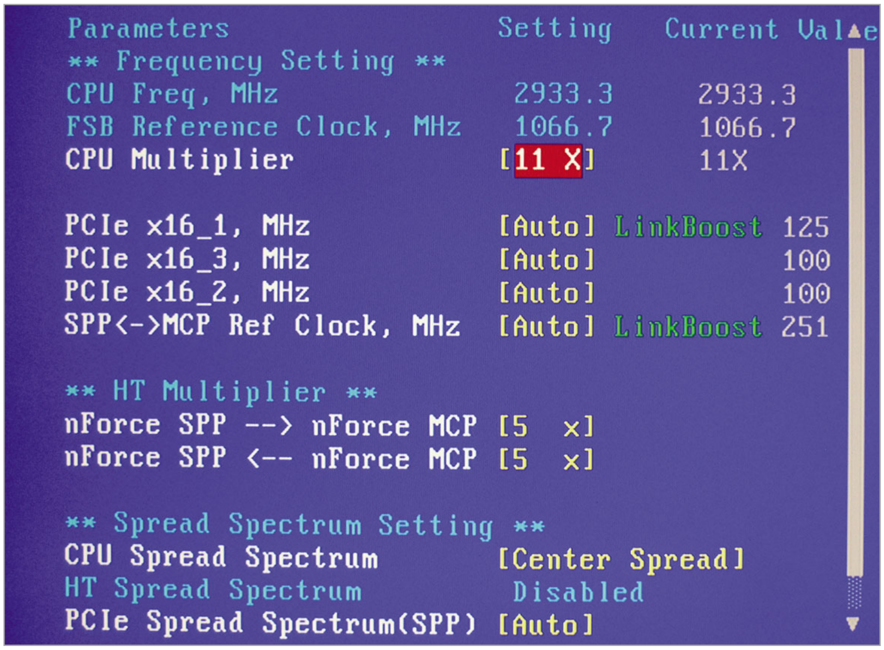
Common Denominators

Whether overclocking processors, RAM, or video cards, the two common modifications that are customarily necessary to ensure maximum performance and long-term, stable operation are enhanced cooling and increased voltage. Most major PC components are rated for operation at a certain speed within certain thermal limits and at a specified voltage. Increasing a component's voltage while simultaneously lowering its temperature will stabilize it at a higher frequency. This is the most basic principle of overclocking.

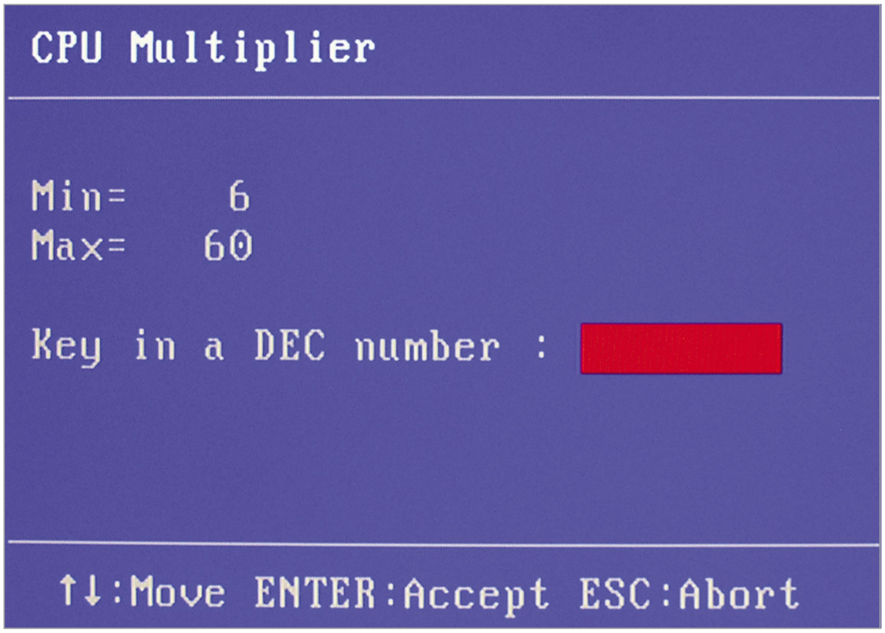
CPU Overclocking

As we've already mentioned, overclocking a CPU requires either raising its multiplier or FSB. We assembled a system using an Evga nForce 680i SLI motherboard and an Intel Core 2 Extreme X6800 processor to illustrate the exact steps necessary to overclock the CPU. Because we used an Extreme Edition processor, multipliers higher and lower than the processor's default were available to us. Standard Core 2 Duo processors, however, only let you use lower multipliers. Even then, you must have a motherboard with the capability of lowering a processor's multiplier.

Don't fret if you don't have the cash for an FX or Extreme Edition CPU. Mainstream processors with lower default operating frequencies usually make the best overclockers in terms of overall value.



```
Parameters                     Setting    Current Val▲e
** Frequency Setting **
CPU Freq, MHz                   2933.3     2933.3
FSB Reference Clock, MHz        1066.7     1066.7
CPU Multiplier                 [11 X]      11X

PCIe x16_1, MHz                [Auto] LinkBoost 125
PCIe x16_3, MHz                [Auto]           100
PCIe x16_2, MHz                [Auto]           100
SPP<->MCP Ref Clock, MHz       [Auto] LinkBoost 251

** HT Multiplier **
nForce SPP --> nForce MCP      [5  x]
nForce SPP <-- nForce MCP      [5  x]

** Spread Spectrum Setting **
CPU Spread Spectrum            [Center Spread]
HT Spread Spectrum              Disabled
PCIe Spread Spectrum(SPP)      [Auto]
```

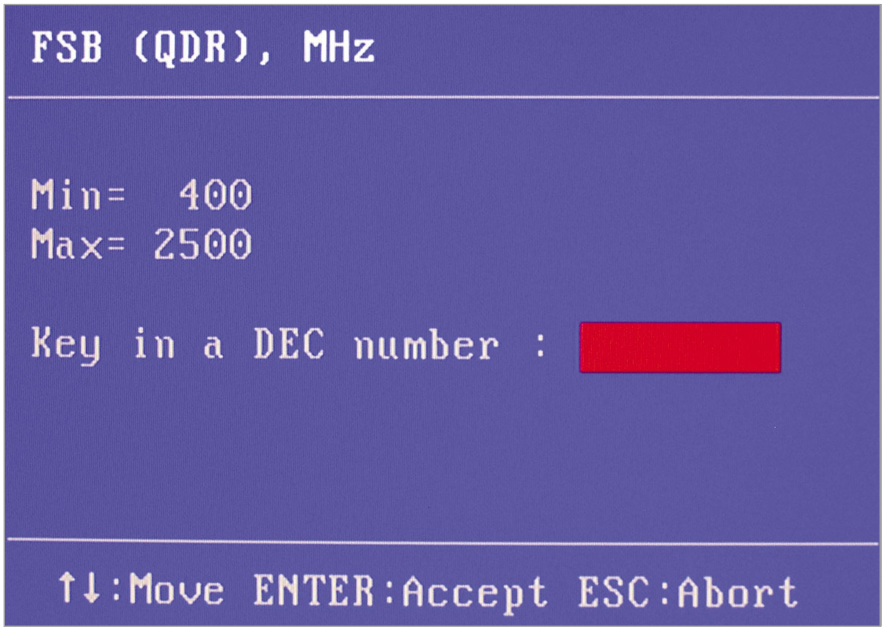


```
CPU Multiplier

Min=    6
Max=   60

Key in a DEC number :

↑↓:Move ENTER:Accept ESC:Abort
```

Altering the CPU multiplier will change its operating frequency. Raise the multiplier to increase the CPU's clock speed. Only Intel's and AMD's flagship processor lines give users the ability to increase multipliers, however.

Before we overclocked our CPU, we took a couple of preliminary steps. After thoroughly cleaning the old TIM (thermal interface material) residue off the processor's heat spreader with some alcohol and a lint-free cloth, we replaced the stock cooler and installed an oversized, aftermarket cooler, complete with a fresh application of Arctic Silver thermal paste. We also tidied up all of our system's wiring to ensure maximum air circulation. We consider these two steps necessary to handle the increased thermal output our overclock would produce.

To begin the overclocking process, we powered up the system and entered the system BIOS. The Evga nForce 680i SLI motherboard we used groups all of its



```
FSB (QDR), MHz

Min=  400
Max= 2500

Key in a DEC number :
```

The CPU multiplier and FSB (frontside bus) frequency work in tandem to determine the processor's final clock speed. Raising the FSB frequency also increases a processor's clock speed.

overclocking-related options in the Advanced Chipset section of the BIOS. We entered the Advanced Chipset menu and met the following group of submenus: System Clocks, FSB & Memory Config, CPU Configuration, and System Voltages. We selected the System Clocks submenu first, which was where we could alter the CPU's multiplier.

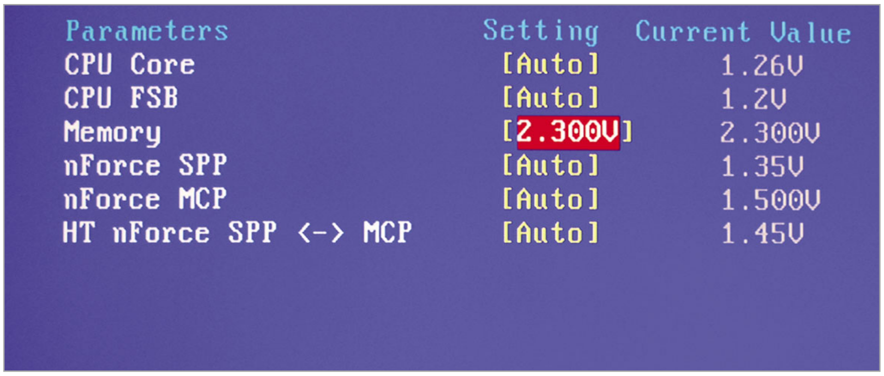
As we stated, the Core 2 Extreme X6800's default multiplier is 11X, so we upped it to 12X for a CPU clock speed of 3.19GHz and restarted the system. After successfully booting into Windows and running a few stability tests, we knew we had more headroom. Bumping the multiplier to 13X (for a 3.45GHz clock speed) was also a success, so we tried again with a 14X multiplier. At 3.72GHz, the system protested, failing to POST. We reset the CMOS and settled on a 13X multiplier.

After finding our CPU's highest stable multiplier, we started tweaking the FSB frequency to find the CPU's maximum stable clock speed. By default, the FSB runs at 266MHz (quad-pumped to 1,066MHz). To alter the FSB, we re-entered the system BIOS' Advanced Chipset menu and selected the FSB & Memory Config submenu. We changed the FSB – Memory Clock Mode option from Auto to Linked to expose the manual FSB clock speed options. Then we chose the FSB (QDR), MHz option and began to increase the FSB. We tried 270MHz (3.51GHz) and booted into Windows without incident, so we tried upping the FSB to 280MHz (3.64GHz). Windows booted, but the system was not completely stable: Applications would randomly crash. We then backed down to 275MHz (3.57GHz) and tried again. This time, the system was much more stable, running for hours with only a few random crashes and no major hangs.

Up to this point, we were focused on finding our processor's maximum stable speed at its default voltage (1.35V). Because our system wasn't completely stable at 3.57GHz, we needed to increase the processor's voltage. Please note that some overclockers like to raise the voltage first and overclock second. This is fine, but because we weren't using any exotic cooling, we wanted to keep the thermal output to a minimum. As a result, we used the lowest voltage possible to stabilize the system.

To alter the CPU voltage on our system, we entered the System Voltages submenu of the system BIOS' Advanced Chipset menu. We changed the CPU Core voltage option from Auto to 1.375V, restarted the system, and tested for stability using a combination of Sandra's CPU Burn-In tool and Prime 95. After about 20 minutes, Prime 95 threw up an error, so we restarted the system once again and tried using a slightly higher voltage. Ultimately, we settled on 1.425V, which let us run Prime 95 and Sandra overnight without errors.

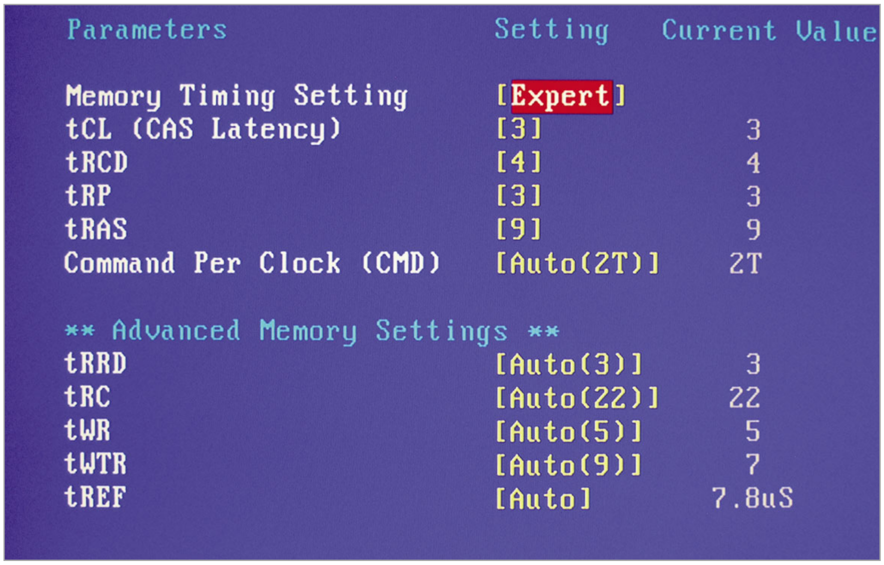
Although we overclocked our CPU "the old-fashioned way" from within the system BIOS, there is an ever-increasing number of Windows-based overclocking utilities. Our Evga nForce 680i SLI motherboard is compatible with Nvidia's nTune. With nTune, users can alter a number of overclocking-related settings from within Windows without ever entering the system BIOS. But some options, such as the CPU multiplier, are only available within the



Parameters	Setting	Current Value
CPU Core	[Auto]	1.26V
CPU FSB	[Auto]	1.2V
Memory	[2.300V]	2.300V
nForce SPP	[Auto]	1.35V
nForce MCP	[Auto]	1.500V
HT nForce SPP <-> MCP	[Auto]	1.45V

To squeeze the most performance out of an overclocked component, increasing the voltage is usually required. Virtually all of today's high-end motherboards give users the ability to alter a number of voltages related to the processor, memory, and chipset.

BIOS; for complete control over a system, manually changing settings from within the BIOS is still the way to go.



```
Parameters                        Setting    Current Value

Memory Timing Setting             [Expert]
tCL (CAS Latency)                 [3]              3
tRCD                              [4]              4
tRP                               [3]              3
tRAS                              [9]              9
Command Per Clock (CMD)           [Auto(2T)]      2T

** Advanced Memory Settings **
tRRD                              [Auto(3)]        3
tRC                               [Auto(22)]      22
tWR                               [Auto(5)]        5
tWTR                              [Auto(9)]        7
tREF                              [Auto]        7.8uS
```

To push memory clock speeds well beyond stock, it's sometimes useful to increase CAS and other latency-related settings. Lower-latency memory is harder to overclock when it's left at its default timings.

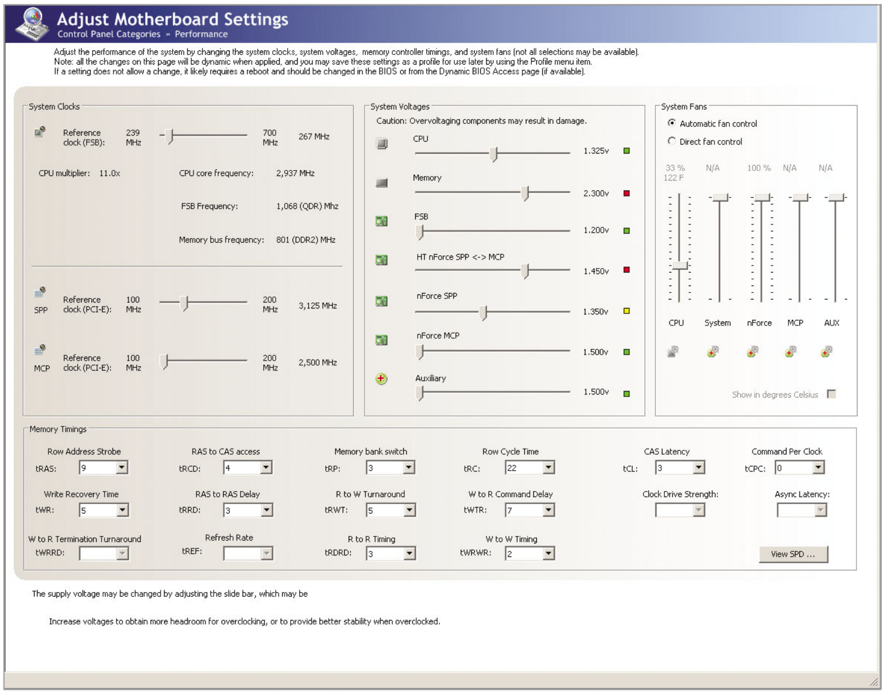
Memory Overclocking

The process to overclock system memory is very similar to overclocking a CPU. Unlike CPUs, the best memory kits for overclocking are typically high-end kits rated for 1GHz+ speeds using mainstream timings. You won't be able to overclock less expensive memory to speeds high-end memory is capable of reaching.

There are a number of things to consider when overclocking memory. Because overclocking memory usually involves altering the FSB frequency, you have to take processor's clock speed into consideration. Some chipsets, such as Intel's, also incorporate their own memory controller that may require additional voltage to achieve higher memory frequencies. (And not all motherboards may let you adjust the voltage.) We had already found our processor's peak stable clock speed, and the nForce 680i SLI chipset is already well-known for hitting FSB frequencies. Because of these factors, we likely wouldn't have to alter chipset voltages, but your mileage may vary.

Our test system was outfitted with 2GB of PC2-8500 Corsair Dominator memory. The TWIN2X2048-8500C5D kit we used is rated for operation at 1,066MHz with 5-5-5-15-2T timings at 2.2V. To begin overclocking the memory, we entered the System Voltages submenu of the BIOS' Advanced Chipset menu. Similar kits in Corsair's Dominator family of products that use the same PCB safely tested at 2.4V at their rated speeds, so we knew our kit's 2.2V rating was somewhat conservative. Because of this, we proceeded to up the memory voltage to 2.3V before overclocking to give us a bit of headroom without adversely affecting temperatures too much. We then navigated to the FSB & Memory Config submenu and chose the Memory Timing Setting option. We set the Memory Timing Setting to Expert and manually locked in the latencies to 5-5-5-15-2T.

Next, we configured the mode that determines how the memory clock speeds change in relation to the FSB frequency. We navigated back to the FSB & Memory config submenu and changed the memory clock mode to Linked. At this setting, the memory clock speed increases in lockstep with the FSB. We then selected the Memory Ratio option and set it to 1:1. A 1:1 memory ratio sets the memory at 1,066MHz without overclocking the processor. At this point, though, we returned to the System Clocks submenu



Adjust Motherboard Settings
Control Panel Categories » Performance

Adjust the performance of the system by changing the system clocks, system voltages, memory controller timings, and system fans (not all selections may be available).
Note: all the changes on this page will be dynamic when applied, and you may save these settings as a profile for use later by using the Profile menu item.
If a setting does not allow a change, it likely requires a reboot and should be changed in the BIOS or from the Dynamic BIOS Access page (if available).

System Clocks

Reference clock (FSB): 239 MHz – 700 MHz: 267 MHz
CPU multiplier: 11.0x
CPU core frequency: 2,937 MHz
FSB Frequency: 1,068 (QDR) Mhz
Memory bus frequency: 801 (DDR2) MHz
SPP Reference clock (PCI-E): 100 MHz – 200 MHz: 3,125 MHz
MCP Reference clock (PCI-E): 100 MHz – 200 MHz: 2,500 MHz

System Voltages

Caution: Overvoltaging components may result in damage.

CPU: 1.325v 🟩
Memory: 2.300v 🟥
FSB: 1.200v 🟩
HT nForce SPP <-> MCP: 1.450v 🟥
nForce SPP: 1.350v 🟨
nForce MCP: 1.500v 🟩
Auxiliary: 1.500v 🟩

System Fans

● Automatic fan control
○ Direct fan control

CPU	System	nForce	MCP	AUX
33 % 122 F	N/A	100 %	N/A	N/A

Show in degrees Celsius ☐

Memory Timings

Row Address Strobe tRAS: 9
RAS to CAS access tRCD: 4
Memory bank switch tRP: 3
Row Cycle Time tRC: 22
CAS Latency tCL: 3
Command Per Clock tCPC: 0
Write Recovery Time tWR: 5
RAS to RAS Delay tRRD: 3
R to W Turnaround tRWT: 5
W to R Command Delay tWTR: 7
Clock Drive Strength:
Async Latency:
W to R Termination Turnaround tWRRD:
Refresh Rate tREF:
R to R Timing tRDRD: 3
W to W Timing tWRWR: 2

The supply voltage may be changed by adjusting the slide bar, which may be

Increase voltages to obtain more headroom for overclocking, or to provide better stability when overclocked.

Most overclocking is done manually through the motherboard's system BIOS, but software overclocking utilities such Nvidia's nTune are becoming increasingly more common and impressive. With nTune, users can alter FSB frequencies, key voltages, and memory timings on certain nForce motherboards.

Keeping Cool

Because overclocking typically involves increases in voltage in conjunction with running a component well out of spec, cooling is of utmost importance. For minor to intermediate overclocks, the stock cooling included with most modern processors, video cards, and RAM is usually sufficient. Hardcore overclocking, however, requires something more. Because heat is a detriment to all things electronic, it's always best to enhance an overclocked component's cooling to maintain stability and ensure a long life.

For example, our Core 2 Extreme X6800 processor running at its default clock speed of 2.93GHz idled at approximately 107 degrees Fahrenheit; it ran at about 132 F under load using the Intel-supplied "stock" cooler. But overclocking it to just over 3.5GHz with a slight bump in voltage to 1.425V jumped the idle and load temperatures up to 130 F and 157 F, respectively. Although the processor remained stable at these temperatures, reducing temperatures is still preferable to preserve the life of the hardware and minimize system errors caused by heat spikes. By simply swapping out the stock cooler for an Arctic Silver Freezer 7 Pro, polishing the processor's integrated heat spreader, and applying a quality thermal paste, we were able to bring overclocked idle and load temperatures down dramatically to about 122 F and 143 F, respectively. More elaborate and exotic cooling methods could drop temperatures even further.

Video cards generate quite a bit of heat, too. The GPU core on the GeForce 8800 GTS we used in our test system idled at approximately 143 F and ran at about 170 F under load with its core and memory running at stock speeds. When we overclocked the core and memory clocks to a much loftier 638MHz/1,823MHz, however, the GPU core hit much warmer temperatures of about 155 F (idle) and 184 F (load).

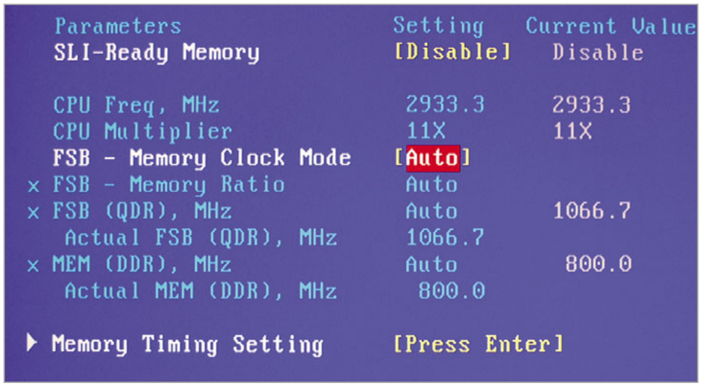
Replacing the cooling on a newer video card like the GeForce 8800 GTS isn't quite as simple as it is for a CPU, but there are a couple of easy fixes that produce good results. Cleaning up messy case wiring will bring internal system temperatures down, which in turn helps GPU temps. But by also adding or repositioning a case fan, video card cooling can be significantly enhanced. By mounting an additional 80mm exhaust fan just above our GeForce 8800 GTS, its temperatures while overclocked drop by approximately 8 to 10 F.

It's a little harder to quantify system memory temperatures without some sort of internal diode to accurately report temperatures, but keeping your RAM cool is important nonetheless. Typical high-end DDR2 memory will run at about 20 to 25 F above the ambient internal temperature in a well-ventilated case. And while it's overclocked, that temperature will likely be even higher. By incorporating some form of active memory cooling, such as Corsair's Dominator Cooling fan or OCZ's XTC memory cooler, significantly lowering the operating temperature of overclocked memory would be extremely difficult.

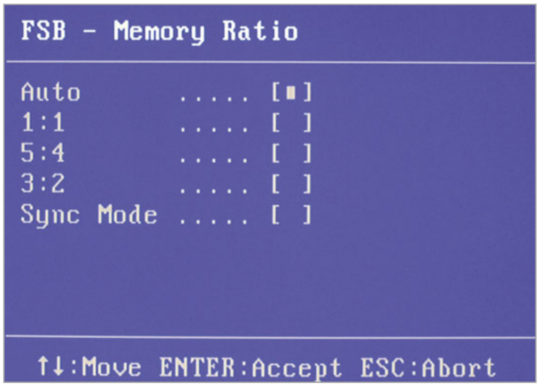
To be sure your components aren't overheating, we recommend using a hardware health monitoring utility that reports real-time temperature data. There are a number of different tools available that'll do the job. Most motherboard manufacturers offer proprietary tools for hardware health monitoring, such as Asus' PCProbe II, Intel's Desktop Control Center, or MSI's Core Cell, and there are a multitude of third-party tools that'll work with a broader range of hardware. SpeedFan (www.almico.com/speedfan.php) is perhaps the most popular. SpeedFan monitors CPU, GPU, motherboard, and hard drive temperatures and can alter FSB frequencies and fan speeds on compatible motherboards. ▲

and dropped our CPU multiplier to 7X. Doing this lowered the CPU speed and allowed us to raise the FSB frequency until we found the memory's peak operating speed. Through a similar process of trial and error as outlined in CPU overclock (raising the frequency a few megahertz at a time, restarting, checking stability, etc.), we determined our memory overclocked to 1,152MHz and remained stable.

But this clock speed required an FSB of 288MHz. If we set our CPU's multiplier back to 13X a 288MHz FSB, it would push the processor beyond its maximum stable speed (13 x 288MHz = 3.74GHz). This is the point where overclockers must strike a balance between CPU and memory performance. We opted for higher



```
   Parameters                   Setting    Current Value
   SLI-Ready Memory             [Disable]    Disable

   CPU Freq, MHz                  2933.3     2933.3
   CPU Multiplier                 11X        11X
   FSB - Memory Clock Mode      [Auto]
 x FSB - Memory Ratio             Auto
 x FSB (QDR), MHz                 Auto       1066.7
     Actual FSB (QDR), MHz        1066.7
 x MEM (DDR), MHz                 Auto        800.0
     Actual MEM (DDR), MHz         800.0

▶ Memory Timing Setting         [Press Enter]
```



```
FSB - Memory Ratio

Auto       ..... [■]
1:1        ..... [ ]
5:4        ..... [ ]
3:2        ..... [ ]
Sync Mode  ..... [ ]

 ↑↓:Move  ENTER:Accept  ESC:Abort
```

Changing the mode by which the memory clock speed is linked to the FSB (frontside bus) is the most common way to overclock system memory. Some motherboards, such as those based on the Nvidia nForce 680i SLI chipset, also give users the ability to manually adjust memory clock speeds completely independent of the FSB.

memory performance and set our system's FSB and CPU's multiplier to 288MHz and 12X, respectively, for final clock speeds of 1,152MHz/3.45GHz (memory/CPU).

Motherboards based on Nvidia's nForce 680i SLI chipset offer an Unlinked mode that gives users the ability to manually dial in the memory clock speed completely independent of the FSB. We've found this setting is somewhat less stable than Linked mode, which uses the traditional ratio/divider settings, but many users have had success. In Unlinked mode, a user can simply navigate to the FSB & Memory Config submenu, select the Unlinked Memory FSB – Memory Clock Mode option and then, using the MEM (DDR), MHz option, simply enter the desired memory speed. Even if you use this method, we still recommend finding the processor's maximum stable FSB to achieve peak performance.

Another easy memory overclocking tool is EPP (Enhanced Performance Profiles). EPP is designed to maximize system performance by automatically tweaking memory and CPU frequencies, multipliers, and voltages. Both the memory and motherboard have to be EPP-capable to use this feature. But with EPP, you only need to alter one setting in the BIOS, and the motherboard will automatically configure the memory to run at its rated speed while simultaneously overclocking the processor and setting the proper voltages and timings. It takes the guesswork out of CPU and memory. Be aware that even though EPP is an open standard, currently only nForce-based motherboards and RAM from Corsair, OCZ, and Crucial support it.

Video Card Overclocking

Overclocking a video card is perhaps the most straightforward because Nvidia and ATI have incorporated the necessary tools into their drivers. And like processors, video cards one or two tiers below the top-of-the-line card represent the best overall value. Today, that means GeForce 8800 GTS or Radeon X1950 XT cards would be ideal choices. They're available for much less than flagship 8800 GTX or X1950 XTX cards but will overclock to somewhat similar performance levels.

We installed a GeForce 8800 GTS into our test system for the purposes of our overclocking experiments. To overclock our card, we needed to install Nvidia's ForceWare drivers along with a copy of nTune.

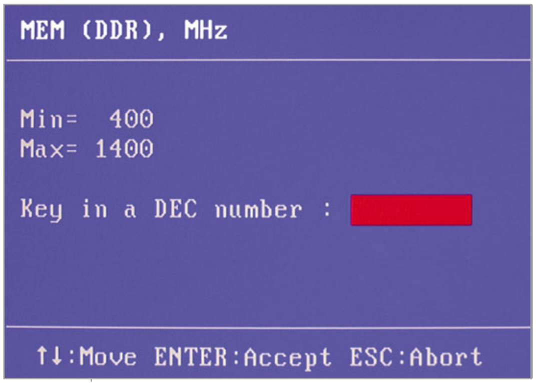
With the drivers and nTune installed, we opened the Nvidia ForceWare Control Panel and clicked the Performance icon. On the Performance menu, we clicked Adjust GPU Settings to access the overclocking options. We selected the Custom Clock Frequencies option and clicked the Find Optimal button. This incrementally raises the GPU and memory clock speeds while running a simple test to check stability. In the end, the nTune took our video card from its stock speeds of 513MHz/1,594MHz (GPU/memory) up to 638MHz/1,823MHz. We should note that the process for overclocking ATI-based video cards is very similar. By clicking Overdrive on the Catalyst Control Center's navigation tree, users can then click the Detect Optimal button, which runs though a similar procedure.

Although easy to use, the automatic overclocking tools built into Nvidia's and ATI's drivers tend to be somewhat conservative in their clock speed recommendations. Third-party applications such as RivaTuner, PowerStrip, or ATITool allow users to take video card overclocking to the next step. Using the ForceWare driver's recommendations as a starting point, we used ATITool to increase GPU and memory clock speeds even further. As ATITool overclocks a card, it simultaneously checks for visual anomalies with its built-in artifact tester.

Pros vs. Joes

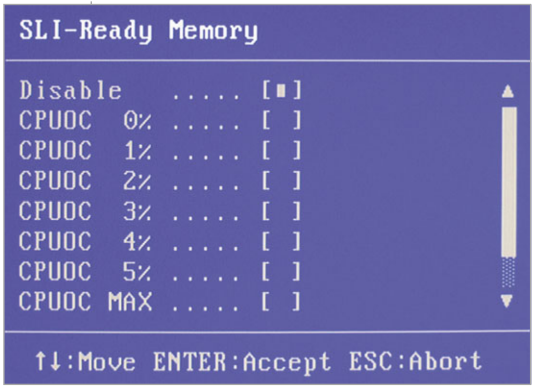
Anyone with the right components and a little bit of knowledge can overclock a PC, but it takes a certain kind of enthusiast to truly push every component in a system well beyond its default speeds. Hardcore overclockers employ a myriad of techniques to push their components further than is possible using traditional means.

One common hardcore overclocking technique is the volt mod. The memory and CPU voltage options many motherboards offer aren't always enough to attain a peak overclock, so experts sometimes modify the voltage regulators on their motherboards to unlock even higher voltages. The same is true for their video cards. To push the GPUs and video memory further than is possible in their stock configuration, some experts will volt-mod their video cards, too. This is usually done by connecting a high-resistance potentiometer to a strategic post on a VREG or shorting a few key pads in a voltage regulation circuit. We've covered a number of popular video



```
MEM (DDR), MHz

Min=  400
Max= 1400

Key in a DEC number :

↑↓:Move ENTER:Accept ESC:Abort
```

When running in Unlinked mode, you can manually specify the memory clock speed in an nForce 680i SLI-based motherboard.



```
SLI-Ready Memory

Disable    ..... [■]
CPUOC  0%  ..... [ ]
CPUOC  1%  ..... [ ]
CPUOC  2%  ..... [ ]
CPUOC  3%  ..... [ ]
CPUOC  4%  ..... [ ]
CPUOC  5%  ..... [ ]
CPUOC MAX  ..... [ ]

↑↓:Move ENTER:Accept ESC:Abort
```

With EPP (Enhanced Performance Profiles), one setting in the BIOS will automatically configure compatible memory to run at its rated speed with proper voltages and timings. EPP simultaneously overclocks your processor, too.

card volt mods here in *CPU*. (See page 32 in the September 2006 issue of *CPU* for our most recent volt mod.)

With any extreme volt mod come extreme temperatures, so truly hardcore overclockers will also use exotic cooling products that can adequately dissipate the increased heat. High-end air coolers are enough for most mainstream overclocking projects; extreme overclocking generally calls for water or even phase-change cooling. We guarantee that anytime you read about a record overclock, the modders responsible were not relying on standard cooling methods. Liquid nitrogen and dry ice are sought-after tools for some hardcore overclockers, but they can be very dangerous. Dry ice or liquid nitrogen are usually used for one-off, extreme overclocking experiments.

Record-breaking overclockers looking for a long-term, overclocked system typically use cascading vapor phase-change coolers. The evaporators in a cascading vapor phase-change rig can mount to the CPU, motherboard chipset, or video cards in a system to bring their temperatures below freezing. Doing so means you can crank up voltages (and in turn, clock speeds) because heat has been greatly reduced from the equation.

A major problem with sub-zero cooling is condensation. When you cool a component below the ambient room temperature, water droplets will form on its surface, much like the water droplets that form on a cold can of soda on a hot summer day. Protecting a super-cooled system from condensation is usually done with insulating foams and rubberized sheaths.

The commitment necessary to assemble and maintain a cascading vapor phase-change rig is not for the faint of heart (or light of wallet), hence the rarity of such rigs. For the hardest of the hardcore, however, nothing less than sub-zero temperatures will do. ▲

by Marco Chiappetta

You Know You've Taken It Too Far When…

Overclocking isn't an exact science. And it isn't always easy to ascertain if an overclock is the root cause of system instability or other random errors. Still, there are quite a few symptoms that we can usually attribute to an overclock that's gone too far.

In regard to processors, failure to POST is one of the most obvious symptoms that you've overclocked it too far. If you've ratcheted the FSB (frontside bus) frequency or multiplier too high on a CPU, it won't operate at all and will fail to respond after you exit the system BIOS. Clearing the CMOS, which restores the BIOS' default values, will bring the system back to life. Now, you can try more conservative overclocked settings.

It's not always as cut and dried, though. Today's processors may seem to be completely stable while overclocked, when they're actually overheating and automatically throttling down to a lower frequency. Using an application like Panopsys' Throttlewatch (www.panopsys.com/downloads) to monitor processor frequency after an overclock is a great way to ensure everything is functioning properly.

Unsafely overclocked RAM can be more difficult to monitor because well-developed hardware monitoring functionality isn't typically incorporated into system memory. Some symptoms typically associated with RAM that's overclocked beyond its limit are erratic POSTs, applications that seem to randomly quit at different times, and general errors that can't be easily replicated. To ensure overclocked RAM is stable, it's best to run a diagnostic utility like Memtest86 (www.memtest86.com) and loop some memory benchmarks for a few hours to see if any errors are generated. If you find your memory is throwing out errors while it's overclocked, try giving it a slight increase in voltage or backing down the frequency by a few megahertz until the errors subside.

Video card problems associated with overclocking tend to be a little easier to diagnose. When a video card's GPU has been overclocked too far, it usually produces visual artifacts within a game or 3D application. The artifacts will sometimes be drawn in a repeating pattern or appear as random pixels of the wrong color. Similar problems arise when a video card's memory has been excessively overclocked. Memory that's running at too high a frequency will usually create blocky visual artifacts or garbled images on-screen. Pushing either the GPU or memory too far may not yield any visual artifacts, but the system could crash when you run a 3D application. In any case, lowering the core GPU and memory speeds until the video card becomes stable again is the best course of action. Also note that modern GPUs have built-in throttling mechanisms similar to a CPU. If you've overclocked your GPU and performance seems to decline, it's possible the GPU is throttling. Try lowering the GPU clock a few megahertz at a time until the card starts to perform as expected.

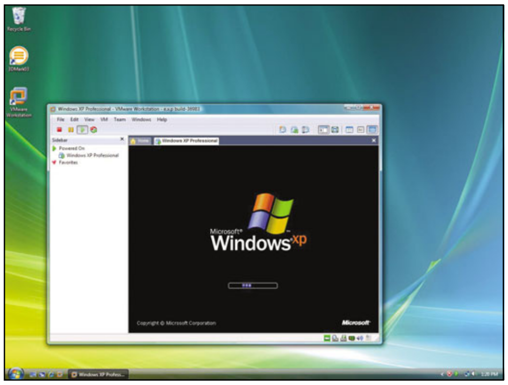
Although it's an ongoing debate, pushing a component too far while overclocking usually won't result in permanent damage. Excessive overheating or over-volting are exceptions and could irreparably damage components. Always make sure to take the necessary steps to adequately cool your components before overclocking them and never push voltages over 10 to 15% above stock unless you know the component can tolerate it.

A system that becomes unstable after overclocking should return to normal once you reset all of the frequencies and voltages to their stock values. If you find that a component is no longer stable even after resetting it, there's a chance it's damaged. But don't panic just yet. Try reinstalling a component's drivers or completely resetting the system BIOS. Occasionally, a system crash due to overclocking will corrupt drives or system files, so repairing the OS may be necessary to regain stability. ▲

The Bleeding Edge Of Software

Inside The World Of Betas

VMware Workstation 6.0 Beta



Official product name: VMware Workstation 6.0
Version # previewed: 6.0 Beta 1
Publisher: VMware
Developer and URL: VMware; www.vmware.com
ETA: Q2 2007
Why you should care: The best in PC virtualization gets better.

The world of computer virtualization (the ability to simulate one computer running entirely within another computer) is getting crowded. At one time, VMware Workstation was essentially alone in this world, but competition from Microsoft and Parallels, along with kernel support in Linux, and now even hardware built into Intel processors has crowded the field. Even VMware has its own free virtualization tool, VMware Server, that's been horning in on its ever-popular VMware Workstation. Fortunately, the development of Workstation continues, culminating with the release of version 6.0 beta.

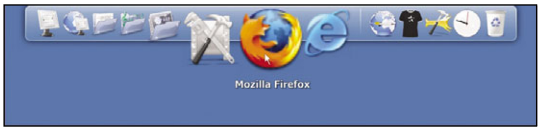
The biggest news in this latest release of Workstation is that it supports 32- and 64-bit Windows Vista as a host OS and guest OS. VMware also adds full support for the latest versions of Ubuntu, Mandriva, Netware, SuSE, Solaris, and Red Hat OSes. When you install the proper VMware tools into the virtualized OSes, there's much better drag-and-drop support. Also new is multiple-monitor support, which lets you indicate how many monitors you want the virtual machine to detect, no matter how many monitors you attach to the host.

Under the hood there are direct hooks to common programming debuggers that make it easier for programmers to look at low-level emulated hardware and operating system issues. Virtual machines can now fully run "in the background," and each machine also acts as a VNC server without the hassle of installing any specialized VNC software in the guest. As always, there are several networking options, which even let you develop a small, private network on a single PC among multiple virtual machines each running different OSes.

Although there's a long list of known issues in the Readme file, the beta feels free from problems. The debugging code, however, does render VMware Workstation a little slower than its previous versions. ▲

by Warren Ernst

RocketDock 1.3.0 Beta 7



Official product name: RocketDock
Version # previewed: 1.3.0 Beta 7
Publisher: Punk Software
Developer and URL: Punk Software; www.punksoftware.com
ETA: Q2 2007
Why you should care: Perhaps the best Apple Dock clone for Windows.

Since Apple released OS X and its Dock application launcher, there has not been a shortage of Dock-like application launchers for Windows. But, there is a shortage of docks that aren't filled with compromises and gotchas—until now.

RocketDock is, as Punk Software puts it, "a smoothly animated, alpha-blended application launcher that is similar to ObjectDock. [It] renders quickly like MobyDock, has the visual sharpness of Y'z Dock, and the stability that neither seem to possess." To further bury the competition, RocketDock works with any skin from other competing products (and if a skin doesn't work, just send it to Punk Software), and it's free.

When a program doesn't work well, "free" is a hollow benefit, but that's not the case here because RocketDock works really well. It even works well on a relatively low-powered PC with multiple monitors running virtual desktop software managing screens. Like Apple's Dock, adding launcher icons is drag-and-drop easy with RocketDock, and when you launch application windows, you can set them to minimize to the Dock, as well. Mouseover effects parallel those of Apple's Dock, complete with smooth magnification and bouncing icons.

Some dock launchers take up lots of memory in order to look good, but even when RocketDock's fully loaded with icons and a transparent skin, it takes up less than 6MB of RAM. CPU consumption is zero when you're not actively using it.

This latest beta release adds some much-requested features, including the option to store all settings in an INI file and small Docklets such as a clock and a Recycle Bin.

Even though you can't yet totally get away from Windows' Taskbar by using RocketDock, give the program some time. Punk Software may yet come up with an attractive total replacement. ▲

by Warren Ernst

UP TO SPEED

Upgrades That'll Keep You Humming Along

This month, Google Earth offers up more detailed images, and Microsoft offers a data migration tool for machines running its new OS, Windows Vista. And Linux users can rejoice because their version of Picasa has come in.

Upgrades

BitComet 0.84

A long-standing favorite BitTorrent client gets improvements in the GUI related to BT and HTTP and a new Clipboard monitor. Several bug fixes come with this release, as well.

Get it at: www.bitcomet.com

DivX Player 6.4.2

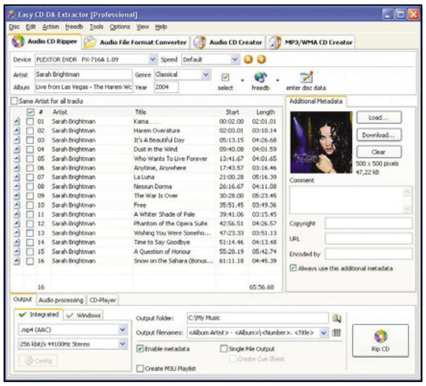
This update stabilizes the burning function and fixes the Open URL function. It also fixes the current time display when using the slider and solves an issue involving dragging DivX windows across dual-monitor configurations.

Get it at: www.divx.com

Easy CD-DA Extractor 10.0.5

The classic audio CD ripper gets an important fix to a problem that made the previous version spike CPU usage. It also updates the FLAC, MP3, and AAC codecs and cleans up several less-critical bugs.

Get it at: www.poikosoft.com



Device: PLEXTOR DVDR PX-716A 1.09
Speed: Default
Artist: Sarah Brightman
Genre: Classical
Album: Live from Las Vegas - The Harem Wc
Year: 2004
☐ Same Artist for all tracks

☑	#	Artist	Title	Start	Length
☐	01	Sarah Brightman	Kama.....	00:02.00	02:01.01
☐	02	Sarah Brightman	Harem Overature	02:03.01	03:10.14
☐	03	Sarah Brightman	It's A Beautiful Day	05:13.15	04:26.68
☐	04	Sarah Brightman	Dust in the Wind	09:40.08	04:01.59
☐	05	Sarah Brightman	Who Wants To Live Forever	13:41.67	04:01.65
☐	06	Sarah Brightman	Anytime, Anywhere	17:43.57	03:16.46
☐	07	Sarah Brightman	La Luna	21:00.28	05:16.39
☐	08	Sarah Brightman	Nessun Dorma	26:16.67	04:11.08
☐	09	Sarah Brightman	The War Is Over	30:28.00	05:23.45
☐	10	Sarah Brightman	Free	35:51.45	03:49.36
☐	11	Sarah Brightman	A Whiter Shade of Pale	39:41.06	03:15.45
☐	12	Sarah Brightman	Phantom of the Opera Suite	42:56.51	04:26.57
☐	13	Sarah Brightman	Wishing You Were Someho...	47:23.33	03:51.13
☐	14	Sarah Brightman	Time to Say Goodbye	51:14.46	04:13.48
☐	15	Sarah Brightman	A Question of Honour	55:28.19	05:42.74
☐	16	Sarah Brightman	Snow on the Sahara (Bonus...	61:11.18	04:45.39
	16				65:56.60

500 x 500 pixels
47,22 kB
Comment
Copyright
URL
Encoded by
☑ Always use this additional metadata

.mp4 (AAC)
256 kbit/s 44100Hz Stereo
Output folder: C:\My Music
Output filenames: <Album Artist> - <Album>\<Number>. <Title>
☑ Enable metadata
☐ Single File Output
☐ Create Cue Sheet
☐ Create M3U Playlist

Flock 0.7.10.1

This build is a maintenance patch that now auto-detects the Blogger Beta, adds a progress bar for uploading photos, adds support for BMP files, and better handles error messages when uploading to Photobucket.

Get it at: flock.com

Google Earth For Windows 4.0.2737

With this upgrade you get a new UI with simpler tools. Also new are much more detailed 3D images of locations, including world landmarks.

Get it at: earth.google.com

Opera For Windows 9.20 Beta Build 8713

The latest incremental update to the Opera browser tweaks fraud protection and proxy authentication. This build also adds a developer console and eliminates an unnecessary scroll bar when at Adobe.com.

Get it at: www.opera.com

Picasa For Linux

A new version of Picasa is now available for Linux. Google Labs says this program should work with any Linux system running on Intel 386-compatible processors, with glibc 2.3.2 or greater, and a working X11 display system.

Get it at: picasa.google.com/linux

Windows Easy Transfer Companion 6 (Beta)

The Easy Transfer tool moves system settings, files, and Favorites from one PC to a Windows Vista PC. Although Vista comes with this tool, WinXP and other Windows machines require the client, too, to send material over cable, network, or disc.

Get it at: www.microsoft.com

WinRAR 3.70 Beta 3

WinRAR fixes some issues involving ISO processing code and displaying progress indicators during processes involving the format with this version. The program's customization routines now operate better under Vista.

Get it at: www.rarlab.com

X-Setup Pro 9.0.060 (Beta)

This system tweaker adds a "classic" user mode for a UI that may be more familiar to old-timers. Fixes some bug issues found in the first beta.

Get it at: www.x-setup.net

Driver Bay

ATI/AMD Catalyst 7.1 For Vista

The latest Radeon graphics drivers in 32-bit and 64-bit Vista versions bring to the new operating system Blu-ray/HD DVD playback, CrossFire support, native OpenGL, new installation managers, and Catalyst Control Center all for Vista.

Get it at: www.ati.amd.com

Nvidia ForceWare 100.59 For Vista

For the GeForce 8880 series of GPUs, these new beta drivers come in 32-bit and 64-bit versions and support for SLI configurations.

Get it at: www.nvidia.com

Nvidia nForce 680i SLI 15.00 For Windows Vista

The motherboard gets drivers for 32- and 64-bit versions of Vista, and it's WHQL-certified. The package contains all of the network SATA, RAID, and SMBus drivers.

Get it at: www.nvidia.com

Vista Codec Package 4.2.6

This comprehensive package of audio and video codecs for Vista includes the latest AC3 filters. It also fixes some redundant Registry entries and installation problems with x64 versions of WinXP (it's compatible with WinXP).

Get it at: www.msfn.org

by Steve Smith

Download Managers

Make A Little Bandwidth Go A Long Way

Download managers were a product of the dial-up networking era. They were programs that let a user pause a long download midsession and pick up where he left off later, even if he hung up and dialed back in again. A user came to appreciate such tools after being disconnected in the middle of a long download—when downloading a single 5MB file could take 20 to 30 minutes.

Today with broadband almost everywhere, download managers might seem less relevant, but after reviewing six of the more popular download managers, I can see how they're useful for not only dial-up users, but also people on high-speed networks.

Putting Download Managers To The Test

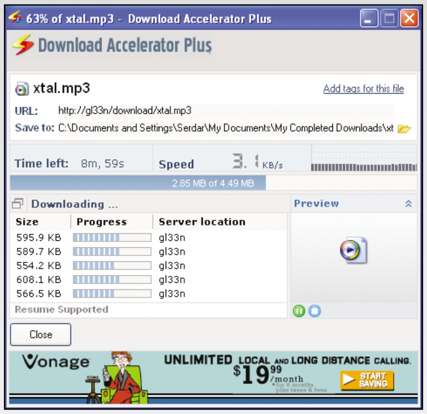
In this roundup, I tested the download managers' behaviors with several common download sites but mainly Download.com, which has a curious multiple-redirect method of invoking downloads, making it useful for testing a program's download-trapping skills. For testing BitTorrent, where applicable, I downloaded files directly from www.bittorrent.com. To test the programs under controlled conditions, I set up a machine-to-machine 100Mbps LAN between two computers, with one running the test software and another running an Apache HTTP and FileZilla FTP server that provided the downloads. When I needed to simulate a dial-up connection, I used the shareware app NetLimiter 2 to throttle the connection speed.

SpeedBit Download Accelerator Plus 8.1

DAP comes in two editions: a free version with some features disabled and the more powerful Premium edition. The free version of DAP is functional enough for daily use, but fair amounts of the program's real estate are plastered with advertising, and the program includes the Google Toolbar (which you can choose not to install). None of this prevents the free edition from being useful; it's just distracting.

When you first set it up, DAP performs some basic connectivity and acceleration tests and has you select your language and put in your email address. DAP's main interface sports four tabs: Downloads (in progress), Completed (downloads), Search (file search browser), and FTP Browser. The Search tab always opens to FileRatings.com. The FTP browser behaves like a standalone FTP client, although, you can only save it if you're a registered user and reuse FTP session information. If you're using the free version of DAP, you have to type in the site name, login, and password each time.

By default, the program takes over file downloads from Internet Explorer, but you can set it to just monitor the Clipboard for URLs or only download through DAP when you right-click a file in IE and select Download With DAP. DAP also includes Firefox and Opera integration. As with many of the other download managers in this roundup, there's an optional on-screen drag-and-drop basket (that DAP calls the Download Basket), the ability to download from all links on a page, and controls per site.


63% of xtal.mp3 - Download Accelerator Plus
Download Accelerator Plus
Add tags for this file
Downloading ...
Preview
Resume Supported
Close
Vonage
UNLIMITED LOCAL AND LONG DISTANCE CALLING.
$19.99/month
*for 6 months plus taxes & fees
START SAVING

xtal.mp3

URL: http://gl33n/download/xtal.mp3

Save to: C:\Documents and Settings\Serdar\My Documents\My Completed Downloads\xt

Time left: 8m, 59s

Speed 3.1 KB/s

2.85 MB of 4.49 MB

Size	Progress	Server location
595.9 KB		gl33n
589.7 KB		gl33n
554.2 KB		gl33n
608.1 KB		gl33n
566.5 KB		gl33n

The ad banners in DAP's (Download Accelerator Plus') unregistered version are irritating, but the program also sports handy features such as a media preview pane in the download window.

Download Accelerator Plus 8.1
SpeedBit
Free (basic edition); $29.95 (Premium version)
www.speedbit.com
● ● ● (free version);
● ● ● ◖ (Premium version)

Once you decide to begin a download through DAP, you can change a number of options, such as the user agent string DAP sends to the remote host (some sites reject download accelerators) or what username/password to use if required. Note that the way to choose how many simultaneous download threads to use is a little obscure: Instead of a specific number, you have to pick from a list of qualitative descriptions such as Normal Speed (which is one thread) and Broadband Optimization (which is five threads). This is a little bothersome, but once you understand how it works, it isn't as big a hurdle in the future. One feature I really liked was the media preview pane in the download window. If you're downloading an audio file and want to start playing back what you've already downloaded of it, you can do it right from this window.

The Premium version of the program has some nice advanced features, such as being able to preview ZIP files while they are still downloading. Other bonuses available for the program include DAP Drive, a remote file hosting service ($35 a year for 100MB), and a series of software subscription channels.

Amaze Soft FlashGet 1.8.1

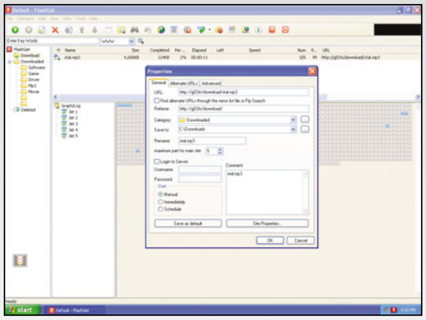
FlashGet is one of the more well-known and full-featured download managers—at least it was an instantly recognizable name to me. The program is also completely free and unrestricted, meaning there isn't a premium or unlocked version available with more features that you can't get with the free version, which ultimately makes FlashGet enormously appealing no matter what your budget. What's more, Amaze Soft has translated FlashGet into more than 40 languages. The program doesn't have any advertising, but the installer will ask you to install the Google Toolbar for IE along with the program. Thankfully, though, the toolbar is optional.

Rather than hijack the default downloading behavior from IE when you click a link, you'll need to right-click the link to open a pop-up menu and select Download With FlashGet to download a file. I preferred to just drag and drop links from the browser to FlashGet's Drop Zone (a small, black box with FlashGet's logo on it that automatically appears on your Desktop). FlashGet can also monitor the Clipboard and activate itself when you copy a valid download URL. If you set a connection type in the program (dial-up vs. broadband), you can cap the program's total traffic speed at a specific bit rate. This way, if you know you're on a tight bandwidth allotment, you can keep the program from stealing everything.

When you start a download with FlashGet, the program presents you with a nice range of options. The most important stuff is right up front; for example, how many simultaneous connections to use to download a file, whether to search for mirror sites hosting a file via an FTP search engine, and where to save a download. You can change all of these defaults, of course, and if you've set rules for downloads from a particular site (for instance, "Don't use more than *X* connections for a file"), FlashGet applies those by default. When downloading, both the Drop Zone box and the program's main window feature a bandwidth monitor. FlashGet also lets you configure processing rules for downloads, such as where to move a file based on its extension, although the actions and options you can set up are limited.

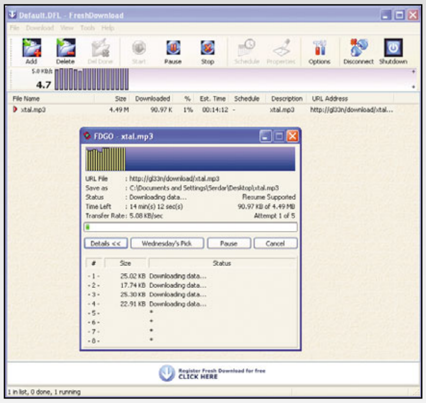
FlashGet's BT options aren't as broad as some of the full standalone clients out there, but it lets you change the most important settings (for instance, the listen port and the upload/download speeds), and it will work with the DHT network. The best BT feature for me was the ability to set how long completed downloads will seed (in hours), so I didn't have to manually remove them.

There's an array of minor features that add to the program's appeal. A scheduling function lets you set a specific day and time to perform a download, so you can flag a file for downloading right away and then have FlashGet automatically fetch it for you later. Also, the free plug-in, FlashCheck, lets you remotely trigger a download by emailing a specially formatted URL to a POP3 mailbox that FlashGet monitors.



You can change many of the default settings in FlashGet's Properties window.

FlashGet 1.8.1
Amaze Soft
Free
www.flashget.com
●●●●



File Name	Size	Downloaded	%	Est. Time	Schedule	Description	URL Address
xtal.mp3	4.49 M	90.97 K	1%	00:14:12	-	xtal.mp3	http://gl33n/download/xtal...

URL File : http://gl33n/download/xtal.mp3
Save as : C:\Documents and Settings\Serdar\Desktop\xtal.mp3
Status : Downloading data... Resume Supported
Time Left : 14 min(s) 12 sec(s) 90.97 KB of 4.49 MB
Transfer Rate: 5.08 KB/sec Attempt 1 of 5

#	Size	Status
-1-	25.02 KB	Downloading data...
-2-	17.74 KB	Downloading data...
-3-	25.30 KB	Downloading data...
-4-	22.91 KB	Downloading data...
-5-	*	
-6-	*	
-7-	*	
-8-	*	

1 in list, 0 done, 1 running

FreshDownload's mix of features for a free program is quite impressive; it even includes scheduling and MD5 checksum features.

FreshDownload 7.70
FreshDevices
Free (for personal use)
www.freshdevices.com
●●●

FreshDevices FreshDownload 7.70

FreshDownload, like FlashGet, is completely free—no adware or banners—and sports well-implemented versions of many of the same features of other programs in this roundup. Some things are unfortunately missing, though; for example, you can't moderate the total bandwidth the program uses, only how many connections it uses per server or download.

In many of the same ways as the other programs in this roundup, FreshDownload integrates with all of the major browsers. For IE integration, you can use a BHO plug-in or a name space handler. The former method's a bit more consistent, and the latter is useful if you've turned off browser plug-ins or don't use them. Options for Firefox and Opera integration also exist, and there's Clipboard monitoring and a download basket on the Desktop.

You can organize downloads into categories, but they aren't set up by default—you have to enable that. Once you do, however, FreshDownload gives you about the same mix of categories available in the other apps in this roundup, such as movies, music, programs, and so on. One other feature FreshDownload preconfigures is a list of sites (such as Download.com) that pre-emptively exclude FreshDownload from managing their downloads. This tripped me up a bit at first because I tried downloading from a couple of the sites in that list and was puzzled as to why FreshDownload wasn't kicking in. Download.com's redirector also seemed to fool the program; no combination of options I tried would let me manage downloads from that site.

This aside, all of the other downloads I performed with the program worked well. You can configure which file extensions and MIME types FreshDownload should manage; the latter's especially handy if you're trying to use the program to manage and save streams from a Web site. You can also configure login/password and proxy and connection limitations per site. If you know that a given FTP site requires authentication and doesn't let you make more than one connection at once, you can enforce that, and then it won't mistakenly ban you.

Several additional features round out the program nicely. If you have an MD5 hash for a given file, you can check the file against it, and FreshDownload can automatically extract ZIP files. Also, you can set up a schedule to download individual files at a future date or even repeatedly at a given time.

Headlight Software GetRight 6.1

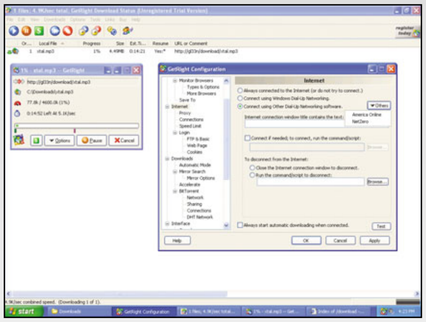
GetRight was one of the first download manager applications—at least, certainly one of the first to achieve widespread usage—and is still immensely popular. It's not hard to see why, either; GetRight's a good program with plenty of great features. That said, the best experiences with the program come after you register or purchase it; otherwise, it nags you to register and puts annoying advertising pop-up windows on your screen.

Once you install it, GetRight catches download links from most browsers by replacing the typical Save As window. There are a number of configuration options for how to invoke this, though, so if you're using some unusual browser setup, you can usually find a combination of settings that work. If you use Firefox, you can opt to integrate GetRight through a plug-in, and there are options for Opera and older browsers (IE5, Netscape 4), as well. You can also copy a URL to the Clipboard as a way to trigger a GetRight session, which works with just about anything. You can manually configure GetRight to validate downloaded files with an MD5 hash (an excellent feature if you download large files such as ISOs). With the $29.95 standard version, however, GetRight will do this for you automatically.

GetRight has a slew of dial-up-specific functions I didn't see elsewhere. You can control when, or if, the program can dial out and connect automatically, and there are even ways to configure nonstandard dial-up software. There are also configurations for AOL and NetZero, but the program has means for integrating almost any third-party dialer through a combination of dialog box monitoring and scripting.

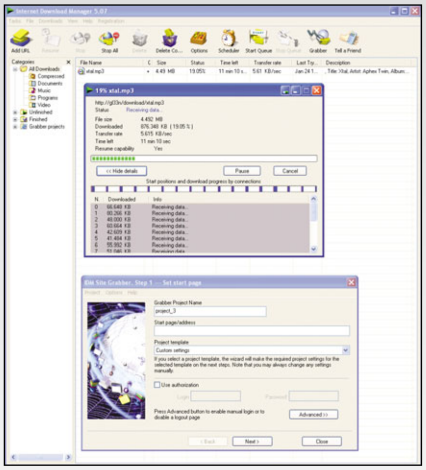
Another feature is native support for BT. GetRight's BT functions are fairly simple compared to the wealth of features you can find in other clients, but it has the ones that matter, such as how much bandwidth to devote to sharing and how to handle port forwarding. If you do use port forwarding, GetRight also supports UPnP and connects with the DHT network to make peer discovery easier.

The Pro version of the program unlocks a few more features, including a scripting engine; the ability to upload as well as download files in controlled ways, for instance, for synchronizing a local directory with a remote one; and the ability to control the program remotely through a Web browser.



GetRight's controls for dial-up networking connections are the most comprehensive of all the programs in this roundup; you can even use programs with nonstandard dialers such as AOL or NetZero.

GetRight 6.1
Headlight Software
Free (trial version); $29.95 (standard version); $49.95 (Pro version)
www.getright.com
● ● ● ◖



IDM (Internet Download Manager) shares some of the common functions of most of the free apps in this roundup, but it has some features, such as Site Grabber, that the others don't.

Internet Download Manager 5.08
Tonec
$29.95 (free 30-day trial)
www.internetdownloadmanager.com
● ● ● ◖

Tonec Internet Download Manager 5.08

IDM (Internet Download Manager) is available in both a free version with a few features missing and a $29.95, fully unlocked version, but both versions are rife with clever minor features. For instance, you can set key combinations to either invoke or suppress the program's activity when you click a browser link. You can also use ALT-click to manage a download with IDM and set it to prevent downloads from using IDM.

IDM supports IE and all IE alternatives such as Maxthon, Netscape, the Mozilla family, and even lesser-known browsers such as Flock. Also, if you check the Use Advanced Browser Integration box in the Internet Download Manager Configuration window (which detects whether a file is being downloaded by inspecting HTTP traffic), IDM will try to find other browsers. Theoretically, you can use this feature with any application that attempts to download a file that's one of the types IDM watches.

IDM supports up to 16 download connections at once per download, although it doesn't attempt to automatically scale the number of connections available based on your network type because you set those overall connection limits. It's also possible to set connection limits for individual servers and a global download limit so that IDM doesn't download any more than *X* megabytes over *Y* hours. Downloading certain types of files brings up a detailed description of the file; for example, with

A Glance At Testing Results

Feature/Program	DAP	FlashGet	Fresh-Download	GetRight	IDM	Orbit Downloader
Downloading/Bandwidth						
Global bandwidth control	Y	Y	N	Y	Y	Y
MD5 or other hash validation	N	N	Y	Y	N	N
Preview during download (music playback)	Y	N	N	N	N	N
Displays file metadata (ID3 tags)	N	N	N	N	Y	N
Use file mirrors	Y	Y	N	Y	N	Y
Scheduling	Y	Y	Y	Y	Y	N
Passed Download.com redirector test	Y	Y	N	Y	Y	Y
Can download all items on a page	Y	Y	Y	Y**	Y	Y
Download from plaintext list of URLs	Y	Y	Y	Y	Y	Y
Site-Specific Features						
Site-specific bandwidth management	Y	Y	Y	N	Y	Y
Site-specific passwords	Y*	Y	Y	Y*	Y*	Y
Site-specific ignore	Y	N	Y	Y	Y	Y
Protocols						
BitTorrent support	N	Y	N	Y	N	N
Interactive FTP client or browser	Y	Y	N	Y	N	N
Custom MIME types	N	N	Y	N	N	N
HTTP header/agent/referer control	Y	Y	Y	Y	N	N
Integration						
Supports Firefox	Y	Y	Y	Y	Y	Y
Supports Opera	Y	Y	Y	Y	Y	Y
Internet Explorer Toolbar integration	Y	Y	Y	N	N	N
Clipboard integration	Y	Y	Y	Y	Y	Y
Drag-and-drop panel	Y	Y	Y	Y	Y	Y
Explicit antivirus integration	Y	Y	Y	Y	Y	Y

** Full version of feature in full/registered version only*

***Through integrated browser*

MP3s, IDM assembles the description from the ID3 tags in the file.

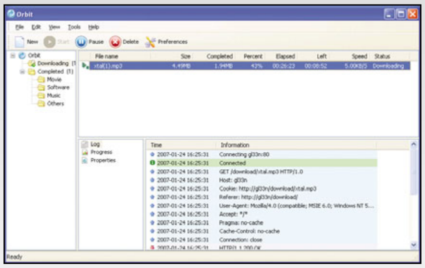
My favorite bonus feature is the Site Grabber, which lets you download an entire Web site for browsing offline. Site Grabber comes with a number of prebuilt templates, including downloading all image, video, or audio files; the entire start page; or you can just download everything in a certain domain name. Ultimately, you have control over how many link levels IDM processes in a Web site, what paths or file types to include or exclude, and how many levels on externally linked sites. IDM will even attempt to process JavaScript actions.

OrbitDownloader.com
Orbit Downloader 1.4.2

Orbit Downloader is probably the simplest and most straightforward program in this roundup. It is free, with no ads or nag boxes, and uses little memory. The 1.4.2 version adds a few features missing in previous versions, such as a scheduler, but there's no support for BT or interactive FTP. Oddly enough, Orbit Downloader bears a striking resemblance to FlashGet—the program's layout and even the format of the Desktop Drop Zone box are quite similar, although I don't think it's actually a clone of that program.

Like the other downloader programs in this roundup, Orbit Downloader integrates with IE by default when you install it. Aside from monitoring clicks in IE, it will monitor the Clipboard for URLs and integrate directly with Firefox, Opera, and IE-derived browsers such as Maxthon. A *very* handy tool that I didn't see in any of the other download managers is the Flash/Streaming Media Catcher. With this feature you can download Flash applications to a standalone SWF file and capture video streamed to Flash applications in the FLV format. (YouTube and other video hosting sites use the FLV format.)

Orbit Downloader arranges downloads into categories such as movies or music, and you can change the category listings by right-clicking the folder hierarchy in the main window. Orbit Downloader gives you an abbreviated set of options when you begin a new download, but you can expand the download dialog to provide things such as a login and password to use, a list of any possible mirror URLs to use for download acceleration, and scheduling options.



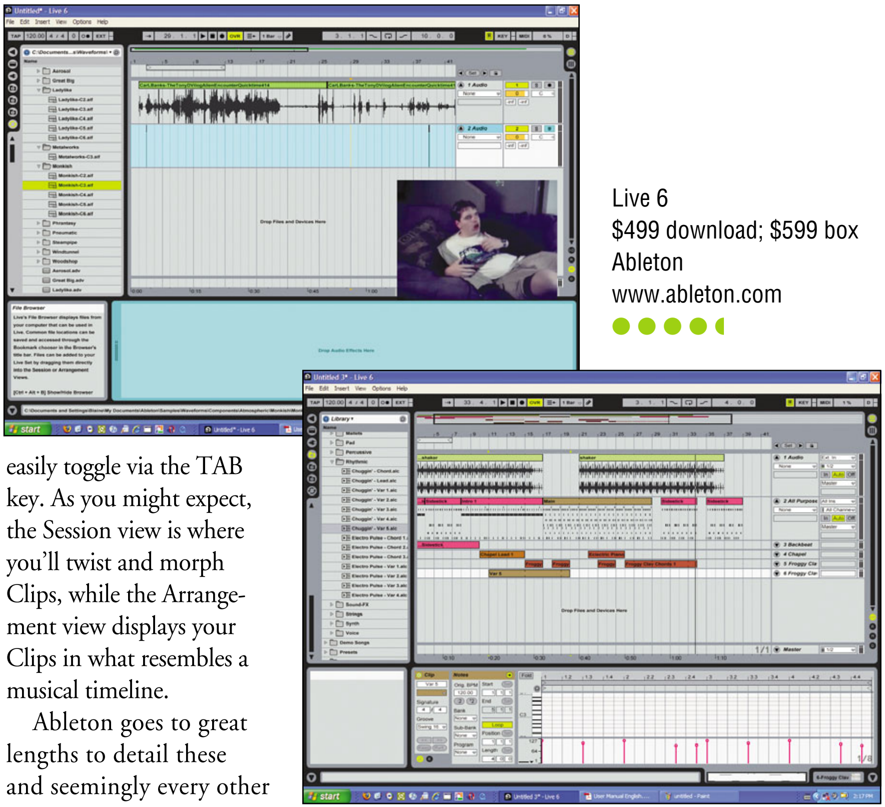
Orbit Downloader looks a lot like FlashGet and behaves a bit like it, too.

Orbit Downloader 1.4.2
OrbitDownloader.com
Free
www.orbitdownloader.com
●●●◖

You can also set download limits per server with Orbit Downloader; the default is eight threads per server, but you can limit that to a single thread for a given download on demand. With Orbit Downloader you can exempt specific servers from processing downloads with the program. In short, a lot of Orbit Downloader's features echo what's available in other download managers, but they're all available here for free, no strings attached, and they work with enough elegance that I didn't miss many of the lesser-used functions. ▲

by Serdar Yegulalp

Ableton Live 6



Live 6
$499 download; $599 box
Ableton
www.ableton.com
●●●●◖

It takes just a few minutes of being in the company of Ableton's insanely powerful Live 6 music creation and performance software for Mac and Windows to realize it offers crazy potential to tweak the living daylights out of audio you record and the audio and MIDI samples and effects Ableton bundles. Conversely, you'll quickly realize that unless you're really passionate about composing, producing, or performing music, and I mean *really* passionate, Live 6 probably isn't your bag for a couple of reasons.

The first and most significant reason is that Live 6 carries stiff $499 download and $599 box prices, although you will definitely get your money's worth. This alone should filter out the passersby from those truly dedicated to their musical craft. Second, if you haven't used a sequencer or DAW-like app previously, Live 6 has a significant learning curve to overcome. Thanks to some excellent organizational work, including Ableton packing Live 6's various elements into one logical (albeit crammed) window, and new support for multiple and dual-core CPUs, however, stably stumbling your way through Live 6 is possible. To effectively use the app, though, means investing considerable time learning and mastering Live 6's many intricacies. I spent days, for example, just obsessively creating and tweaking various loops with Live's virtual knobs and sliders.

Creating and manipulating loops and others compositions takes place in Live Sets, which reside in Live Projects, essentially a folder system that also houses demo Sets. Clips are chunks of audio you can use to build your music. You can create and alter your own Clips—as little as a cheap microphone or Input cable can get you started—to help shape songs, remixes, scores, etc. Altering Clips on the fly constitutes much of Live 6's considerable charm and is a primary reason why DJs and musicians who are seeking to enhance their live performances are attracted to Live 6. You can work with Clips in either Arrangement or Session views, which you can easily toggle via the TAB key. As you might expect, the Session view is where you'll twist and morph Clips, while the Arrangement view displays your Clips in what resembles a musical timeline.

Ableton goes to great lengths to detail these and seemingly every other facet, function, and capability of Live 6 via stellar manuals, lessons and tutorials, and instructional videos on its Web site featuring pro musicians, DJs, and Ableton's own staff. Further, several books, clinics, and special issues of *Computer Music* magazine have been devoted to Live 6. The program is that massive. After nearly two months of consistent use working on my own Clips—created using everything from riffs I recorded with a Fender Strat to handclaps to whistles—I managed to piece together several compositions, but I really had only begun to scratch the surface of Live 6's abilities.

For example, I had yet to use the program's loop-based tools in a performance setting, something you can see DJs and bands do in Ableton's instructional videos. Ableton strongly emphasizes Live 6's performance capabilities, and when you see how you can use the app as a unique and highly adaptable instrument that you can also acclimate to a studio setting, you'll understand why.

Throughout my testing I continually found myself grabbing samples from the program's new Essential Instrument Collection, which contains several gigabytes of brass, string, percussion, and other instruments from SONiVOX. Using these, I was able to create scores to accompany Live's new support for QuickTime video. Just drag a QuickTime clip into Live's windows, and you're scoring on the fly. Also new in this version are instrument and effect Racks (customized collections of instruments, effects, plug-ins, and tweaking tools), EQ Eight (doubling the number of independent filter bands), Dynamic Tube (an excellent vacuum tube effect), Warping (a handy tempo-synching tool), and Deep Freeze (a CPU-resources saver).

Sufficiently detailing even Live 6's most basic tools would take many pages. Suffice it to say, if you're serious at all about working with music, you're probably already aware of Live's excellent reputation among musicians, producers, composers, and others within the music industry. If you have the financial means and music fuels you, it's hard to imagine you being disappointed with Live. ▲

by Blaine A. Flamig

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

Diskeeper Corporation Diskeeper 2007 Professional

Diskeeper Corporation was Executive Software. Its defragging app was Diskeeper 6, 7, 8, etc. The defragger is now Diskeeper 2007 and comes in six versions ranging from Home to Administrator. Name changes aside, Diskeeper is a long-time favorite of those who know why defragging is important. Defragging is still a tough sell, though, to less-informed newbs and power users set in their defragging routines. Ultimately, DK2007's new background defragging ability is an excellent match for anyone who wants an effective defragger he can turn on and tune out.

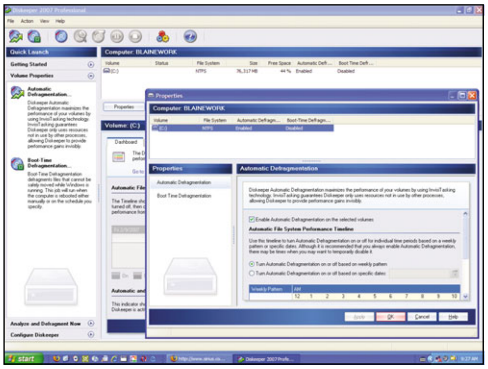
Diskeeper calls its on-the-fly defragging ability (on by default) Automatic Defragmentation. New InvisiTasking technology powers the tool by grabbing idle, otherwise wasted system resources. With AD on, drains on my system were barely noticeable while running a video editor and other apps concurrently. To track resource use, DK2007 includes a real-time chart, comparison charts, stats, reports (one lists your most fragmented files), and a Dashboard tab to configure your AD schedule.

Overall, DK2007's three-pane interface couldn't be much more intuitive. A Quick Launch pane puts the essentials in one area, plus walks you through manually analyzing and defragging volumes. Power users will appreciate the gory details the Computer and Volumes panes offer and DK2007's support for software and hardware RAID arrays, running multiple defrags at once, keeping the swap file near a volume's front, and defragging system files that Windows typically won't let you touch after startup via the Boot-Time Defragmentation tool.

Indicative of my three test systems, DK2007 took seconds to analyze and generate reports on a WD 79GB drive in a WinXP 2.41GHz Athlon XP 3700+ rig (DK2007 supports 768GB max volumes). Post-defrag stats indicated an average of 1.34 fragments per file and DK2007 increasing system read time of fragmented files by 9% and all files by 6%. Boot times increased initially on all systems (I ran CHKDSK on each volume after running Boot-Time Defrag), but bumps in speed were noticeable during video conversions and gameplay, particularly on a WinXP Intel P4 3.2GHz rig with a 150GB Seagate drive, 1GB RAM, and five user accounts.

If your current defragger has you satisfied, pass on DK2007 for now. If you're uninitiated or uninterested in defrag duties, DK2007 is an excellent, automatic fit. ▲

by Blaine A. Flamig



Diskeeper 2007 Professional
$49.95; $29.95 (upgrade)
Diskeeper Corporation
www.diskeeper.com
●●●●◖

CyberLink PowerProducer 4

This "Next Gen" version of PowerProducer offers HD DVD (up to 15GB) and BD (Blu-ray disc; up to 50GB) authoring at up to 1,920 x 1,080 resolution (25Mbps MPEG-2). It also covers DVD, editable DVD±VR), SVCD, and VCD, and it offers 61 menu templates, many with motion. However, authoring options are drastically limited for at least BD: PP4 did not let me edit a BD menu at all. I didn't have an HD DVD drive to try.

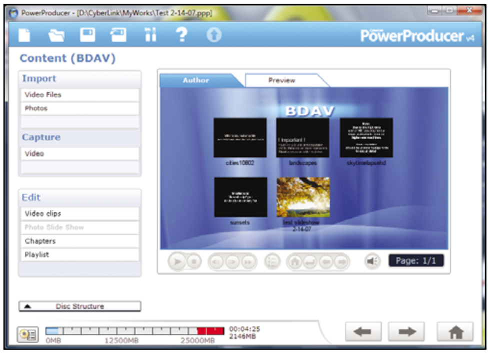
Still, there's just about every feature a beginning or intermediate home DVD maker will want, including options to fade out background music when the video ends and automatic pans and zooms for slideshows (although you have to create a slideshow in the included liteware PowerDirector Express 5 to apply this). PP4 also supports animated thumbnails with transparent frames in DVD menus, as well as first play video. There's direct-to-disc and broad capture support, plus several "Magic" editing and image enhancement tools, including antishake and automatic video creators.

On the whole, PP4's interface is simple, friendly, and relatively easy to pick up. I found several glitches in the original build, but nothing an update couldn't fix.

I tested PP4's Blu-ray capabilities using Windows Vista Home Premium with a Sony BWU-100A and CyberLink's Build 1311 patch. After much tinkering, I finally got an uncopyrighted video and slide-show BD-RE I made to play back (sometimes) in CyberLink PowerDVD 7 Ultra using an HDCP-enabled GeForce 8800 GTS card with 100.64 drivers in Vista. InterVideo WinDVD 8 Platinum wouldn't play the disc, however, and neither app allowed a non-HDCP Radeon X850XT to decode it.

PowerProducer 4 lets you make very basic BDs and HD DVDs along with very nice DVDs. It's an early app for the blue laser formats, which are still a pain to work with on a PC, so keep things in perspective before you buy. ▲

by Marty Sems



PowerProducer 4
$69.95
CyberLink
www.cyberlink.com
●●●●

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

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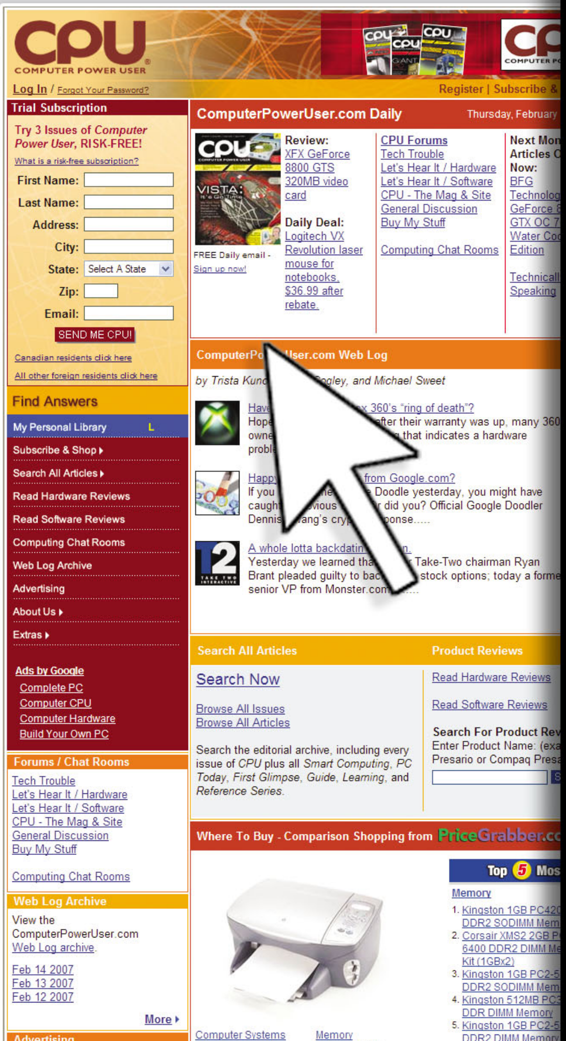
www.computerpoweruser.com/idealbb/default.asp



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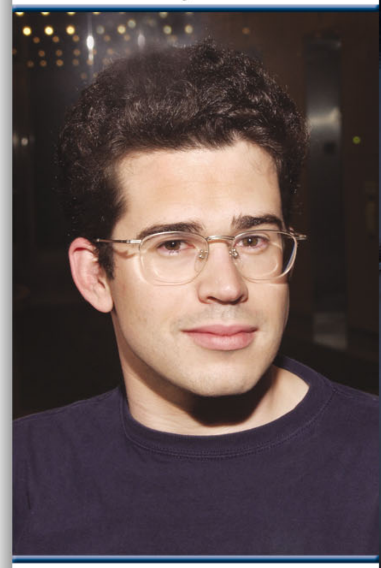
CPU COMPUTER POWER USER

An Open Letter To Jim Allchin

by Chris Pirillo



Jim,

Congratulations! Seriously.

I'm glad that you finally got Windows Vista out the door, but I'm equally as thrilled to know that you're working on releasing SP1 by the end of this year. I've been using Vista pretty much exclusively for the past few weeks and have had my fair share of ups and downs with it. I haven't been compelled to switch back to XP (or OS X, for that matter), so take that for what it's worth.

Driver support seems to be vastly improved over XP, although the latest round of updates has turned one of my laptops into somewhat of a brick. (I can't get back into the shell, despite my best efforts) I've also been quite impressed with the high-definition audio options available to me through a Microsoft driver. It took virtually no time at all to configure my 6.1 surround-sound system. I still can't get my Microsoft LifeCam to work, but all in good time.

I'll be watching the shell developments with extreme interest. My font "hack" has kept me from going bonkers in day-to-day activities, although my workarounds have not come without hiccups. There are still inconsistencies replete throughout the whole of Vista, but I believe that a majority of UI oversights will be dealt with appropriately from this point forward.

UAC (User Account Control) is annoying. Yes, I realize it's supposed to protect users from themselves and digital intruders, but it's more of a bug than a feature to me. I "had" to turn it off; it kept getting in my way. Apple does a much better job at protecting and informing the user when a process requires elevated privileges. Much like the Information Bar in IE7, UAC needs a massive overhaul in future releases. Your heart is in the right place, but usability is not.

I believe that marketing's choice on the whole clearification.com/theiap.org advertising campaign was ill-advised. It was gut-wrenching to watch the string of your "clutter-free" commercials on television on the night of Vista Eve, largely because I knew what you were trying to accomplish through them. The "PC" in Apple's Get a Mac commercials does a better job at explaining what Windows can do for a user. Really, isn't it time that Microsoft found a marcomm agency?

Even though I have two monitors attached to my system (an AMD quad-core with plenty of processing power), I still find the Vista's Sidebar relatively useless for regular use. Perhaps it's that few developers have created interesting widgets up to this point. If I see another variation of the analog clock, it'll be too soon. Maybe in another year, there will be a few gems that I won't be able to live without.

ReadyBoost? Stroke of genius. Microsoft Paint? Not so much.

To minimize compatibility issues, I'm sticking with the 32-bit installation of Vista for the time being. When I need to do a bit of media crunching (audio and video apps), I'll boot into x64 and have at it with capable apps. I'm impressed that most of my 32-bit apps run well in a 64-bit environment, but I've encountered enough software snags to keep me from permanently switching (despite the 64-bit installation's ability to take advantage of more than 2GB of RAM).

And I must admit, despite being a hardcore Windows user, I frequently find myself feeling insanely jealous of OS X and just about everything that Apple has to offer the consumer marketplace. Leopard is more than lustworthy to someone who spends just about every waking moment on the desktop. More than anything, it's momentum that keeps me from switching, but the next versions of Entourage and Office for Mac just may push me over the edge.

I've had so many people ask me—personally and professionally—if they should get Vista or just wait for a while. This is probably the first version of Windows I can remember suggesting that people approach with great caution. The move from Windows 3.1 to 95 was a no-brainer, as was 2000 to XP. But I don't think Vista will reach maturity until SP1 is released. I'm seeing too many compatibility issues ahead, both with software and hardware.

Good luck moving forward,

Chris

Chris Pirillo would consider an all-out switch to Apple's OS X, but that would leave him with very little to write about after the next column. What operating system could survive without an updated version of Internet Explorer or Windows Media Player? He would likely spend his day looking for a system Registry cleaner for the Mac, blogging all the while at chris.pirillo.com, inviting bloggers to write on Lockergnome.com, hosting technology enthusiasts at his annual conference (Gnomedex.com), entertaining people with his daily comic at bLaugh.com. No, we think Chris will stick with Windows . . . for now.

UAC is annoying. Yes, I realize it's supposed to protect users from themselves and digital intruders, but it's more of a bug than a feature to me.

You can dialogue with Chris at chris@cpumag.com.

by Pete Loshin

Power To The People! Right On, Web 2.0!

So many of the cool things that people are doing with Web 2.0 empower the ordinary citizen rather than aim for some corporate bottom line. Not all these applications are open-source: Some promote corporate objectives. What they share is that they all add value to resources that are freely available.

Enron Explorer (enron.trampolinesystems.com). When the U.S. Federal Energy Regulatory Commission put 200,000 of Enron's internal emails from 1999 to 2002 into the public domain as part of its investigations, it didn't just open a window into the notorious company but also provided an interesting real-life dataset for researchers. Trampoline Systems used that data to test its SONAR technology. According to Trampoline, "SONAR plugs into the corporate network and connects to existing systems such as email servers, contact databases, and document archives. It analyzes information from these systems to build a map of social networks, information flows, expertise, and individuals' interests throughout the enterprise." With Enron Explorer, you can analyze each Enron player's main contacts and see what they were talking about and when they talked about it.

Openserving.com. I don't quite understand how they're planning to make money, but Openserving.com, from Wikia.com, Wikipedia founder Jimmy Wales' next wiki-oriented start-up, gives away Web services for open/collaborative Web content. You can enroll an existing blog, wiki, or Web community (or propose a new one), and Openserving hosts it for nothing and gives you 100% of your ad revenue. A screening process keeps scammers, spammers, and other riffraff out, and Wikia's on the lookout for new open-source, Web-based collaborative software to host new Web applications and services. Bessemer Venture Partners wrote them a $4 million check, so there has to be a business plan. My guess is Wikia/Openserving will skim off ad revenue of the portal pages, and content providers get ad revenue from their own pages.

Gmap-pedometer.com. I'm not the only one who loves this Google Maps mashup (and this isn't the first time I've mentioned it), and it's become even better over the last year or so. It's simple: Map out your route on a Google map, and the pedometer calculates the distance covered. Neato features include ability to save your route, easy doubling-back for round-trip calculations, a calorie counter, and an option to display altitude changes for runners, bikers, and hikers who care about altitude gain/loss.

Defective by Design Tags at Amazon.com. Everyone knows about Amazon.com, one of the few indubitable Web 1.0 winners; they introduced the very Web 2.0 tagging feature not long ago. The Defective by Design (www.defectivebydesign.org) campaign against DRM leverages Amazon tags by getting consumers to identify and, where possible, avoid products that have been designed to be defective because they incorporate various DRM measures.

What's wrong with that? It adds production costs to software, hardware, and content products but removes value from those products. You shouldn't have to pay extra to vendors who want to limit the number of times you could read a book or remove your ability to back up your music CDs, but that is exactly what DRM is designed to do. Products with DRM are designed to add value and profit opportunities for the vendors while reducing the value offered to the consumer.

Gethuman.com. From the home page, "The gethuman project is a consumer movement to improve the quality of phone support in the U.S. This free [Web site] is run by volunteers and is powered by over one million consumers who demand high-quality phone support from the companies that they use." Check out the database; find out how to short-circuit the IVR (interactive voice response) systems that big corporations love to foist on customers; and speak to a person when you need help. ▲

(NOTE: For answers to last month's column, please go to www.cpumag.com/cpuapr07/answers. Please note that Google search results are subject to change over time; answers given were correct as of last month's print date and may no longer appear at the top of a Google search.)

You can get saucy with Pete at pete@cpumag.com.

Pete Loshin, former technical editor of software reviews for Byte Magazine *(print version), consults and writes about computing and the Internet. He also runs www.linuxcookbook.com. He owns shares of both Microsoft and Red Hat and believes that Windows isn't for everyone, but neither is Linux.*

> Check out the database; find out how to short-circuit the IVR systems that big corporations love to foist on customers; and speak to a person when you need help.

When Real & Virtual Economies Collide

Building The Virtual Economy: Part II

When University of California, San Diego, grad student Ge Jin brought his documentary cameras into gaming "gold farms" of rural China, he recently opened the door on a strange world where virtual and real-world economies fully blur. Here, third-world factory conditions seem to wrap around new age technologies. In these rooms stuffed with connected PCs, scores of young Chinese are hired to play games such as Lineage and World Of Warcraft for 12-hour shifts, but there's more robotic clicking than role-playing fun going on here. In many cases, these players camp out in a single spot and kill the same monsters again and again simply to rack up in-game virtual gold winnings. Their employers then take this accumulated pot and sell it for genuine cash in the enormous black market for trading virtual gold and items in the real-world economy. For an upcoming documentary, Jin is among the first to interview some of the thousands of WoW "gold farmers" who other players may meet any time they play these games.

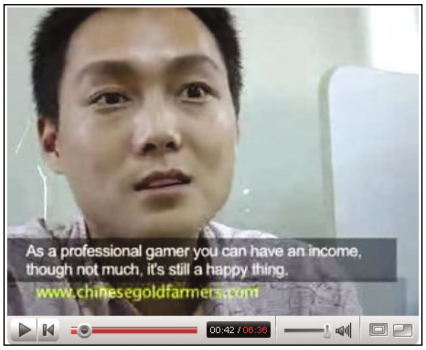
"This is his job," explains one worker in the documentary about being a gold farmer, "And there is pressure from the boss. He has to stay there. If some other player comes to that spot, he has no choice but to fight with them. So we professional gamers do have an impact on regular gamers." Virtual world fun meets real-world business interests.

In fact, the impact of real-world economy on virtual game experiences and the value of virtual money on real markets have become increasingly complex. Millions of new players joined online MMORPGs such as WoW and nongame virtual worlds such as Second Life in 2006. RMT (real money trading) of game artifacts is nothing new to online worlds. For years denizens of Ultima Online and EverQuest famously purchased highly evolved game characters and rare game items for thousands of dollars on auction sites. An entire industry led by RMT marketplace powerhouse IGE has emerged, and literally billions are now at stake.

The new economy in and around virtual worlds is so unprecedented but lucrative that legislators everywhere scramble to keep up. The Korean legislature is pondering a bill that would prohibit the real-world trading of cyber money, which some analysts there estimate is a $1 billion market already. And now that real-world brands such as Dell are investing in SL and actually selling virtual goods there, some U.S. legislators are considering whether to tax virtual profits. After all, companies such as IBM and Toyota will likely take these investments as tax deductions, and the Linden Dollars actually do have an out-of-game market value at the LindeX exchange. Julian Dibbell, author of "Play Money: Or, How I Quit My Day Job and Made Millions Trading Virtual Loot" (see the Q&A sidebar), says he claimed $11,000 in earnings on his tax return from selling in-game treasures for cash on eBay.

Game-enomics 101

The virtual worlds of EverQuest, WoW, and SL have attracted serious economic thinkers precisely because they're regarded as "perfect commodity markets," says researcher Vili Lehdonvirta at his Virtual Economy Research Network (www.virtual-economy.org). There is little government regulation or market manipulation to disturb the supply and demand dynamics that govern in-world economies. But that relative purity may also make WoW and SL easily susceptible to manipulation. Big brand marketers discovered that they too could easily disrupt SL's virtual world economy by inadvertently undercutting market values. "If they enter the auto market and give [cars] away, it would have a deleterious effect on the native car market," says Reuben Steiger, founder of Millions Of Us, who helped Toyota devise its in-world Scion City.



As a professional gamer you can have an income, though not much, it's still a happy thing.

www.chinesegoldfarmers.com

According to Ge Jin, users have watched a video blog of his upcoming documentary on virtual world "gold farmers" 500,000 times.

Q&A

Julian Dibbell: Playing For Real

Ironically, a successful real-world trader of in-game money, Julian Dibbell, doesn't use the RMT market to enhance his own character and status in WoW. "That's like paying someone to watch television for you," he says. And yet, he spent a year trying to make a living from selling in-game lucre from Ultima Online at eBay.

CPU: So, how much did you end up making?

Dibbell: It was a very slow ramp up, but in the last month I made a $3,300 profit.

CPU: What were your most lucrative sales?

Dibbell: Real estate is quite a market in Ultima. The biggest-ticket items I ever sold were houses for $800 and some weapons and armor for close to that. But the mainstay of my business was gold pieces—everybody wants gold.

CPU: Now that you're a player only, don't you find gold farmers disruptive to the economy and intrusive to in-game play?

Dibbell: I find that, on the one hand, I'm not personally interested in buying gold to get ahead, but I don't object if someone else wants to skip what they think are the boring parts. I don't see how it is cheating in any way.

CPU: Inflation? Harassment?

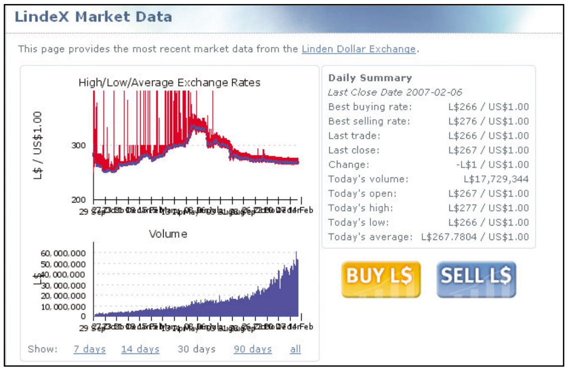
Dibbell: Inflation is part of every single virtual world, and it isn't as big a problem in a virtual world as it might be in the real world. As for gold farmers occupying a spot that other people want to farm, I haven't experienced it. I haven't experienced a lot of the harassment others describe, and I have been a level 60 player. I think the extent to which people get exorcised over gold farming they are really venting anger at all the other complexities and unfairness [in these game worlds].

CPU: Where does RMT go from here? What's next?

Dibbell: You have to look at Second Life to see where it's headed. It's more complex and open-ended than WoW, but its economy functions in similar ways. And the main difference is that Linden Lab encourages the exchange of virtual currency for U.S. dollars, and that opens up all kinds of possibilities—and risks. ▲

The big argument against real-world trading of virtual world items and gold is inflation and the eventual creation of a two-class system. In most MMORPGs, the amount of money in the economy isn't finite but increases as destroyed monsters drop their gold and items. Gold farmers are killing at an alarming rate, and so pumping more money into the economy and raising prices for everyone. Many gamers complain that the only way to get better items is to become serial killers themselves or do RMT to get the money to level the field.

Although many players object to the out-of-game economy and its effects on in-game play experiences, it goes without saying that companies such as IGE and the gold farmers generally could only exist if there were a market for their wares. According to a survey of nearly 2,000 MMORPG participants done by the Daedalus Project (www.nickyee.com/daedalus) in 2005, 22% of players said they had conducted RMT to increase their gold holdings. In fact, among those who do buy gold out-of-game, the Daedalus survey found the players spent an average $135 on these exchanges. Some players just don't want the "grind" of accruing cash slowly and so buy gold as a shortcut. Massive games like this have to accommodate a range of play styles, some argue.



LindeX Market Data

This page provides the most recent market data from the Linden Dollar Exchange.

Daily Summary

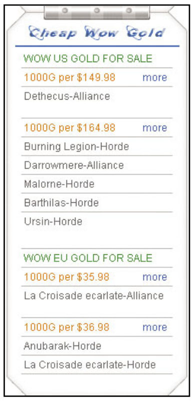
Last Close Date 2007-02-06

Best buying rate:	L$266 / US$1.00
Best selling rate:	L$276 / US$1.00
Last trade:	L$266 / US$1.00
Last close:	L$267 / US$1.00
Change:	-L$1 / US$1.00
Today's volume:	L$17,729,344
Today's open:	L$267 / US$1.00
Today's high:	L$277 / US$1.00
Today's low:	L$266 / US$1.00
Today's average:	L$267.7804 / US$1.00

Unlike MMORPGs, Linden Lab encourages trading its Second Life Linden Dollars for cash in an open, real-world market.

And for many players such as Dibbell, there are arguments on both sides about the effect of RMT on the game experience. "If you only get gold from the servers, from whatever a monster drops, or selling items to nonplayer vendors, then you're living on a fixed income relative to inflation," he says. But most players do trade with one another in-game, and an inflated market also spikes the prices any player can get from an in-game buyer.

And some, including Ge Jin, argue that there are cultural benefits to in-game gold farming. Game workers in China don't have the same range of skills as many Western workers, but they can communicate with that culture via their game skills. Jin told virtual worlds researcher Wagner James Au in a recent interview that, "If more social and economic activities happen in accessible 3D game worlds, people who don't have access to other culture capital



WOW US GOLD FOR SALE

1000G per $149.98 more

Dethecus-Alliance

1000G per $164.98 more

Burning Legion-Horde

Darrowmere-Alliance

Malorne-Horde

Barthilas-Horde

Ursin-Horde

WOW EU GOLD FOR SALE

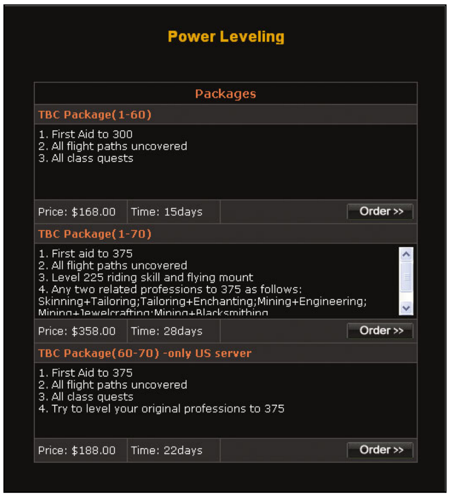
1000G per $35.98 more

La Croisade ecarlate-Alliance

1000G per $36.98 more

Anubarak-Horde

La Croisade ecarlate-Horde



Power Leveling

Packages

TBC Package(1-60)

1. First Aid to 300
2. All flight paths uncovered
3. All class quests

Price: $168.00 Time: 15days

TBC Package(1-70)

1. First aid to 375
2. All flight paths uncovered
3. Level 225 riding skill and flying mount
4. Any two related professions to 375 as follows:
Skinning+Tailoring;Tailoring+Enchanting;Mining+Engineering;
Mining+Jewelcrafting;Mining+Blacksmithing

Price: $358.00 Time: 28days

TBC Package(60-70) -only US server

1. First Aid to 375
2. All flight paths uncovered
3. All class quests
4. Try to level your original professions to 375

Price: $188.00 Time: 22days

Virtual world exchanges make good—and very real—money by selling in-game gold at low prices and leveling services that can bulk up a character in a hurry.

but gaming knowledge will be more likely to be included in global interaction." Games like WoW are worldwide phenomena, and so they engage some complex issues that are both economic and cultural.

Harvesting Farmers

Major players in the RMT supply chain are taking dramatic actions lately. eBay is delisting auctions involving virtual goods from MMOGs. Blizzard is famously closed-mouth about its security measures. The company didn't respond to our requests for comment about the new expansion and update for WoW: The Burning Crusade, which some expected to enforce new sanctions and safeguards against gold farming and in-game cheats. Blizzard's VP of Development, Itzik Ben Bassat, told the UK's *Guardian Unlimited* at WoW: BC's launch that, "We have the tools in place which we have developed to combat this. But there are cheats in the real world, too; this isn't just a virtual world problem." Going any further in outlining its policing strategies might give too much away to would-be cheats. WoW considers RMT a violation of the end-user agreement, which defines all in-game content as the sole property of Blizzard. This stance alone has already spawned one lawsuit by a trading company for virtual goods and instigated serious scholarly arguments over who really owns the property one accrues and creates in a virtual world. Second Life operator Linden Lab is demonstrating that there may be a range of future policies in the market because its citizens maintain complete rights over their in-world creations and property. Linden Lab seems to encourage this blurring of real and virtual economies.

At the end of 2006, Blizzard said it was combating the problem vigorously by closing 105,000 accounts in November alone and removing 12 million gold (WoW's in-game currency) from the system. Dibbell says the policy has had an effect on U.S.-based WoW servers, where he thinks Blizzard is concentrating its efforts. "[Blizzard] causes considerable grief and hardship to companies in China who are [farming]." Chinese gold farmers then had to refocus efforts to European servers where Blizzard seemed to be under less pressure from players to act against farming. Increasingly, Blizzard is building into the game coveted items that players can't get through trades and only through being in the right place or winning the right battle. By coding items so players can't trade them, some of the best goods are impervious to RTM wealth or out-of-game markets.

Apparently, Blizzard has a balancing act of its own to manage because 3.5 million WoW subscribers come from China, where, along with Indonesia, much of the gold farming originates. Blizzard announced this past February that it was extending the new Burning Crusade expansion into mainland China through its current partner there, The9 Limited. With the monstrous revenue that 3.5 million subscribers represent, the company can't afford to alienate or demonize the Southeast Asian market because of some bad actors.

And it's in the very nature of these worlds—the creativity they inspire—that players will find ways around any safeguards. The next frontier for virtual entrepreneurs is "power leveling" services, where players hire a company to take control of their game character and play it in order to bulk up levels and goods. There are also some reports of escort services, where teams of hired players will accompany a gamer into a tough dungeon and help him defeat it. Call them virtual mercenaries. Call them cheats. Call them resourceful. With more than 15 million MMOG players worldwide by some estimates, that's a lot of brain power to pit against a handful of developers trying to limit a vast universe of behaviors. After all, these are seasoned players who are here because an MMOG is open-ended and subject to our imaginations. Isn't finding ways of getting ahead, getting powerful, and winning big just all a part of the game? ▲

by Steve Smith

Infinite Loop

Cell phone: **$199**

Notebook: **$1,500**

Security system and cameras
for your home: **$2,000**

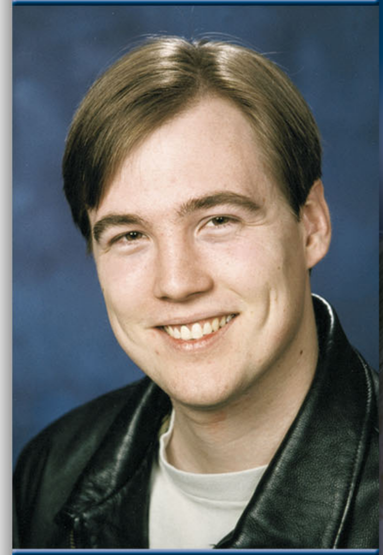
Keeping track of a thief's movements in real time on your notebook to help the police catch him in the act: **Priceless**. ▲

Source: www.spiegel.de/international/0,1518,454362,00.html

The Department Of Stuff

browsers.txt

by Rob “CmdrTaco” Malda



Rob "CmdrTaco" Malda is the creator and director of the popular News for Nerds Web site Slashdot.org. He spends his time fiddling with electronic gizmos, wandering the ’Net, watching anime, and trying to think of clever lies to put in his bio so that he seems cooler than he actually is.

The Internet has always been segregated. In the early days, it featured nothing but text. But Mosaic changed that by giving us the innovation of graphics. After Netscape introduced us to things such as the CENTER element and backgrounds, the Internet was on its way to getting real innovations such as JavaScript, embedded Flash applications, multimedia content, and so on.

As time goes on, the number of weird proprietary extensions has propagated almost exponentially. For each of these extensions, there seems to be a new browser to further complicate matters. The vast majority of all Internet users today are using either Microsoft’s Internet Explorer or Mozilla’s Firefox. Making your modern Ajax applications work properly and render identically on these browsers’ varied CSS implementations is challenging at best and impossible at worst. And even comparing Firefox 1 to 1.5 to 2 or Internet Explorer 5 to 6 to 7 is a maintenance nightmare with no end in sight.

But there’s a second class of browsers: the Safaris, the Operas, and the Konquerors of the Internet. Millions of people use these browsers, and their implementations for common functions that the Internet is built on are sorely lacking.

Now I’ve heard arguments on both sides of this debate: I am told that Opera adheres to the standards, Safari meets the specs, etc. Unfortunately, since about seven or eight years ago when Internet Explorer began doing things slightly differently with Web standards, now millions of Web pages exist with the “wrong” HTML or CSS. If a Web page looks slightly different in Galeon than in Camino, well that’s just something we all have to deal with.

The problem with this is that it goes far deeper than just font sizes and minor layout glitches. What is actually happening is that major service providers such as banks, government agencies, and mega corporations are standardizing on providing functionality for IE6/7 and leaving Firefox out in the cold. And don’t even get started if you want compatibility for iCab or something even more obscure.

As Webmasters, we have an obligation to do our darnedest to make our browsers work with the standards that exist. Sometimes those standards are RFCs that clearly document how things should work. Other times those standards are simply “make it work” in the most popular three or four platforms. But browser designers have the same obligation. For years now Webmasters have been kludging their code to make sure that users using the top few platforms and versions experience their Web sites consistently. But it’s simply impossible to test every platform, version, and browser combination unless you are a mega corporation with large-scale testing groups.

Today Webmasters are fighting that compatibility battle over Ajax and CSS applications. The subtle differences that render every browser unique are a thorn in the side of Web developers everywhere. The major Web toolkits Google and Yahoo! create attempt to encapsulate some of the kludges necessary to make things operate transparently from browser to browser, but much work remains. And, unfortunately, most of this work falls to the browser developers.

Meeting the standard Acid2 test for CSS compatibility will get most browsers the majority of the way. A new set of standards, however, needs to exist to give us a real-world target to shoot for to insure that the modern Ajax applications that look to be the future of the Internet function not only on the mainstream commercial browsers but also on the free platforms available to people who run noncommercial operating systems. We don’t want to lock the future into a single platform, but responsibility for preventing that from happening falls into the hands of Web designers, Web browser builders, and even the users who choose unconventional browsers.

The alternative is for Webmasters to build a full JavaScript and a partial JavaScript implementation, segregating the Internet, increasing development time, and in general just making life hard on everyone. Nobody can like that idea. ▲

Major service providers such as banks, government agencies, and mega corporations are standardizing on providing functionality for Microsoft IE6/7 and leaving Firefox out in the cold.

Contact me at malda@cpumag.com.

ROAD Warrior

by Jen Edwards

TabletKiosk has rolled out a trio of Tablet PCs featuring Microsoft Vista.

TabletKiosk Unveils First Vista Tablet PC

TabletKiosk recently introduced its Sahara Slate line of Tablet PCs that come preloaded with your choice of Linux or Windows XP/Vista. Three models are available, depending on the desired configuration, and each has a 12.1-inch, TFT XGA display with a wide viewing angle.

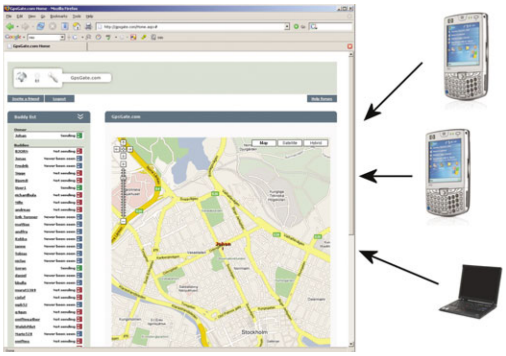
The low-end i412T is equipped with an Intel Celeron M, 512MB of RAM, a 60GB hard drive, Bluetooth 2.0, Wi-Fi, and a biometric fingerprint reader. The i440T steps up to an Intel Centrino Duo mobile processor with double the RAM and an 80GB hard drive.

The most interesting new model is the i440D, which offers the best of both worlds with a dual-mode, active digitizer and passive touchscreen. Passive touchscreens are responsive to any pointer—a stylus, a pen cap, or the end of your finger—and highly convenient, but you can't rest your hand against the screen. That can be awkward when carrying a tablet PC instead of working with it on a desk or table. But the i440D can switch between passive touchscreen and active digitizer mode (which requires a special pen) at the touch of a single button for improved flexibility.

Base prices start at $1,795 for the i412T, $2,195 for the i440T, and $2,295 for the i440D. A build-to-order option is also available, offering a maximum of 4GB of RAM and hard drive capacities up to 160GB. ▲

Track Friends & Colleagues In Real Time With GpsGate

GpsGate is a utility that allows multiple desktop or Pocket PC applications to share a single GPS device, even across a network, Bluetooth, or ActiveSync connection. With the newly announced GpsGate.com online portal, it's possible to track the location of friends and/or business associates in real time. You can also plug your GPS data into Google Maps or Google Earth for more detailed maps or a satellite view. GpsGate is $29.95, and a free membership account is required to access the site's features.



Impress your friends (or just freak them out) by using GpsGate to track them in real time.

This rugged case from OtterBox lets you take your BlackBerry almost anywhere.

BlackBerrys Can Travel Anywhere With An OtterBox

Otter Products (www.otterbox.com) recently unveiled two rugged cases for BlackBerry handhelds; the OtterBox 1931 and 1930 provide water-resistant protection for 7200 and 8700 series devices, respectively. All device features such as the keypad, scroll wheel, and buttons remain fully accessible, and Donaldson acoustic membrane vents let you make calls when the phone is safely secured inside. The charge/sync port is also accessible while the phone is in the case.

The cases are made of ABS plastic with rubber overmolding for enhanced grip and drop protection. The inside of each case is also rubberized, protecting your BlackBerry from cosmetic damage. An optional swivel belt clip is also available. ▲

Sansa View
Puts Movies In Your Pocket

The latest portable movie player from SanDisk (www.sandisk.com), the Sansa View, packs an impressive amount of features into a very small device. Measuring 78.5 x 123 x 16.9mm (HxWxD), the Sansa View has a 4-inch, widescreen display, 8GB of internal memory, headphone jack, and a built-in speaker to share movies and videos with a friend. An SD/SDHC expansion card slot allows you to easily transfer photos from a digital camera or camcorder.

The Sansa View can play video files and also includes a photo viewer with slideshow support. It supports a variety of online music services, such as Rhapsody, MTV Urge, and Yahoo! Music, and an integrated TV-out jack allows you to view content on a TV as well as the device itself. The Sansa View is compatible with Windows Media Player 10 and 11 for content synchronization and works with both Windows XP and Vista. The Sansa View will be available this spring for $299.99. ▲

The Sansa View has 8GB of memory and a gorgeous 4-inch, widescreen display.

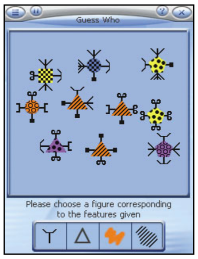
Entertain & Train Your Brain With Spb Software House

Spb Software House (www.spbsoftwarehouse.com) has released two new applications for Windows Mobile devices. Spb Mobile DVD ($24.95) is an easy-to-use program that converts your DVD movies and desktop video files into a format you can watch on your mobile device. Spb Mobile DVD's features include high conversion speed, real-time previews, and adjustable output quality.

You can convert entire movies or small clips, enabling you to take your favorite films (or just scenes) wherever you go. No additional software is required, because Spb Mobile DVD supports WMV, which works with Windows Media Player. VGA, QVGA, and square screen devices are supported.

Spb Brain Evolution ($19.95) is a collection of 10 challenging minigames in the spirit of the popular Brain Age and Big Brain Academy games for the Nintendo DS. Testing and Training modes are available, and individual games include Sudoku, Numbers, Minesweeper, Quadronica, Balltracker, Matches, Memorics, Arithmetics, Guess Who, and Encyclopedia games. Multiple player profiles are supported, and the game tracks high scores and completion progress.

Free trials of both applications are available from Spb's Web site. ▲



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Brain Evolution helps you stay sharp and mentally focused with 10 brain-training games.

S-XGen UMPC Bridges The Gap

On-the-go professionals often face difficult choices when it comes to mobile technology. A mobile phone or smartphone is necessary to keep in touch with colleagues and clients but may not let you edit spreadsheets and presentations when you're on the road, and text entry can be difficult at best. Laptops let you carry all of your files and applications with you, but are relatively cumbersome and suffer from short battery life.

Seamless WiFi aims to solve all of these problems by packing a phone and PDA with Microsoft Office into a small package called the S-XGen. Measuring 6.5 x 3.8 x 1.25 inches (HxWxD) and weighing less than a pound, S-XGen is a hybrid device that's built around an Intel Xscale 520 MHz processor with a 4-inch TFT display, 256MB of RAM, 20GB hard drive, an SD expansion slot (support for cards up to 2GB), and low-resolution Web cam. A nearly full-sized, folding keyboard is integrated into the unit, nicely solving the text entry problem without adding a great deal of bulk or requiring the user to carry a separate peripheral.

Connectivity options are quite impressive, with Wi-Fi, Bluetooth, and a tri-band (900/1800/1900MHz) phone radio. An RJ-45 jack facilitates wired 10/100 Ethernet connections, and an IR port is also included. The unit is based on Microsoft's Pocket PC platform and will include mobile versions of Outlook, Word, Excel, and PowerPoint. Initial preorders of the device have already sold out; the S-XGen is expected to be available later this year for $1,395. A video of the prototype is available at www.slwf.net/main-site/attention_bar_links/S-XGen-Overview.html. ▲

At Your Leisure

The entertainment world, at least where it pertains to technology, morphs, twists, turns, and fires so fast it's hard to keep up. But that's exactly why we love it. For the lowdown on the latest and most interesting releases in PC entertainment, consoles, DVDs, CDs, and just leisure and lifestyle stuff we (for the most part) love and recommend, read on.

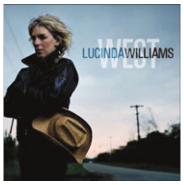
Audio Video Corner

by Blaine A. Flamig

$19.99
Vice Music
www.blocparty.com

Bloc Party—"Weekend In The City"

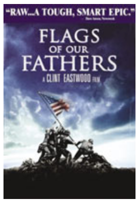
Where Bloc Party's 2005 debut "Silent Alarm"—named 2005's album of the year by *NME*—was a wide-ranging conglomeration of styles and topics, the very solid "Weekend In The City" is a more grown-up, focused, but bleaker affair from leader Kele Okereke and his South London lads. Seconds into the first track of "Weekend," "Song For Clay (Disappear Here)," Okereke fires off this beauty: "I am trying to be heroic/In an age of modernity." Later he lashes out, "East London is a vampire/It sucks the joy right out of me." Brooding and dense, but also airy and alive, "Weekend" manages to capture all the potential that an approaching Friday night brings, but also the stark, often unpleasant realities that Sunday morning ushers back in.



$19.98
Lost Highway Records
www.lucindawilliams.com

Lucinda Williams—"West"

Great songwriters are courageous creatures who fear no lyric, no matter the pain, anger, regret, and sorrow they'll likely induce in themselves, their listeners, and their muses. For 10 years plus, few songwriters have translated such emotions to song with more poetic honesty and bluesy intelligence than Lucinda Williams. On "West," a thoroughly sad but explorative record, Williams opens your throat wide and pours shot after shot of hurt ("Mama, You Sweet"), agony ("Fancy Funeral"), confusion ("Are You Alright?"), and bitterness (the acidic "Come On") down your gullet. Rather than perpetuate the sadness and anger, however, the songs go down as forward-thinking, healing elixirs.



$19.98
DreamWorks Pictures
www.flagsofourfathers.com

Flags Of Our Fathers

Clint Eastwood's unflinching film about the six soldiers who raised the American flag at the Battle of Iwo Jima isn't his best work, but it's among his most important. Strong on gritty imagery that inspires courage, patronage, sympathy, and anger, "Flags" takes us past the battlefield to show us the emotional battles soldiers face and either overcome or succumb to once the war is over. Eastwood got a brilliant performance from Ryan Phillippe (one of America's finest young actors) as John "Doc" Bradley, the subject of a book son James helped author. Eastwood followed "Flags" up with the Oscar-nominated "Letters From Iwo Jima," which presents a Japanese perspective of the battle.

$19.98
Lions Gate Entertainment
www.theusversusjohnlennon.com

The U.S. vs. John Lennon

Few men in modern history have created as much controversy in the name of peace as John Lennon, whose impact on 1970s' youth, the Vietnam War, politics, and grassroots activism in general is undeniable. Here, filmmakers David Leaf and John Scheinfeld tackle Lennon's fight against Richard Nixon and the FBI, who aimed to deport Lennon due to his influence on young voters during Nixon's 1972 re-election bid. Using interviews and incredible footage with Walter Cronkite, G. Gordon Libby, Yoko Ono, Lennon, and others, the film is a fascinating look at a fascinating period in American history.

See the full reviews from A/V Corner at www.cpumag.com/cpuapr07/AYL

DVD Byte

3/6

Borat–Cultural Learnings of America for Make Benefit Glorious Nation of Kazakstan

Hawaii Five-O–The Complete First Season

Fast Food Nation

3/13

Casino Royale

The Holiday

Mr. & Mrs. Smith (Blu-ray)

3/20

The Nativity Story

Blood Diamond

Letters From Iwo Jima

3/27

Happy Feet

The Pursuit of Happyness

National Lampoon's Van Wilder: The Rise of Taj

WORLD OF WARCRAFT®
THE BURNING CRUSADE™

OK, Who Left The Dark Portal Open?

-by Chris Trumble

$39.99 (PC, Mac) • ESRB: (T)een

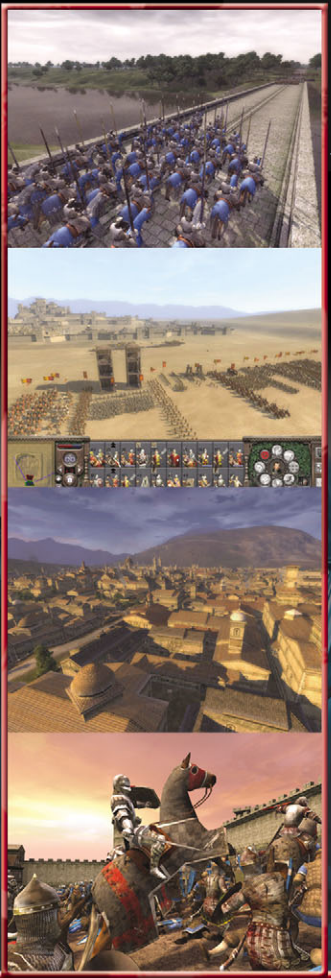
Blizzard Entertainment • www.worldofwarcraft.com

Blizzard's ridiculously successful MMORPG World Of Warcraft needs little introduction; if you don't play it yourself, chances are very good you know someone who does, and who takes every opportunity to tell you about it ad nauseam. Blizzard did a relatively good job over the game's first two years of adding content here and there in the form of in-game events via a number of patches, but on January 16th, the company launched its first full-fledged expansion to WoW called The Burning Crusade. With one or two very minor exceptions, we love everything about this enormous bolt-on; even though the game's graphics engine and some gameplay elements are a bit dated at this point, WoW is still the best MMOG going, and TBC is a big reason why.

One of the first things you'll notice when you install TBC and log in is that four regions of the original world map that were previously inaccessible are now open and ready for business. That works out to two low-level zones per new race, which is another major addition in TBC: Players can now create new characters of either the Draenei (Alliance) or Blood Elf (Horde) races. Blood Elf characters get started in Eversong Woods and can take on new quests and explore new areas there and in Ghostlands. Draenei characters begin at level 1 on Azuremyst Isle and progress to Bloodmyst Isle before setting off to seek their fortunes in the rest of the world. In addition to these four realms, players can now venture through the Dark Portal in Blasted Lands and explore the seven new zones of Outland, the shattered remnants of the Orc homeworld Draenor. The Outland realms are the real meat of the expansion, as they pick up where the original game left off, providing new quests, dungeons, and raids for characters of levels up through level 70 (the new level cap).

In addition to two new races, 11 new zones, and 10 more experience levels, TBC adds a new player profession called jewelcrafting; a huge list of new items, weapons, and armor; a fresh menagerie of mobs and bosses; and flying mounts for characters who reach level 70. Basically, there's more of everything now, and most of it is very good.

There have been some bugs here and there, and the expansion has dramatically altered WoW's overall economy—although whether that is good or bad depends largely on your profession and inventory. (We're also not sure why the Blood Elves got stuck riding chocobos, but that's a minor gripe.) Overall, however, The Burning Crusade is a huge upgrade, and for our money it locks in World Of Warcraft as the most enjoyable online gaming experience you can have today. ▲



MEDIEVAL II TOTAL WAR™

Get Your Chainmail On -*by Dr. Malaprop*

$49.99 (PC-DVD) • ESRB: (T)een • Sega • www.totalwar.com

The last Medieval: Total War game we played was in 2002. Medieval II (Creative Assembly's fourth in the Total War series) is the original's spiritual successor, but it's more of an evolutionary step up from the major graphics/gameplay upgrades that were introduced in 2004's Rome: Total War. Unit detail, animations, environments, and lighting effects work in conjunction for a much prettier game.

One of the joys of the Total War games has always been having a deep, turn-based strategy game (a la Sid Meier's Civilization IV) sitting on a massive real-time battle combat engine. It's like having two games seamlessly blended into one with the addition of lengthy campaigns where your reward for victory is the unlocking of other factions. You can easily spend the better half of a day working through a single campaign, so there's no shortage of play time for your dollar. But having the option to play a few other factions from the get-go would have been preferable. (HINT: Any studious gamer can find cheat codes to unlock other factions .)

The real-time portion of the game, which can be paused at any point, makes pitting entire armies against each other a relatively simple affair without forsaking strategy. For those not familiar with the real-time portion of the series, imagine strategically controlling the Roman battle formations in real-time against the oncoming barbarian horde in the opening sequence of "Gladiator"—hundreds of individual units accurately wielding weaponry in full-scale combat.

It's not long before you'll notice some odd AI tactical decisions, something brought over from Rome: Total War. The interface changes little and is not ideal for a newer player. To fans of the previous games, the interface is like a comfortable glove. The tiresome wait for AI animations during turn-based maneuvers becomes annoying in long campaigns. These issues should have been fixed by any game's fourth iteration. Still, Medieval II promises many hours of gaming for any fan of turn-based strategy games. ▲

RAYMAN RAVING RABBIDS

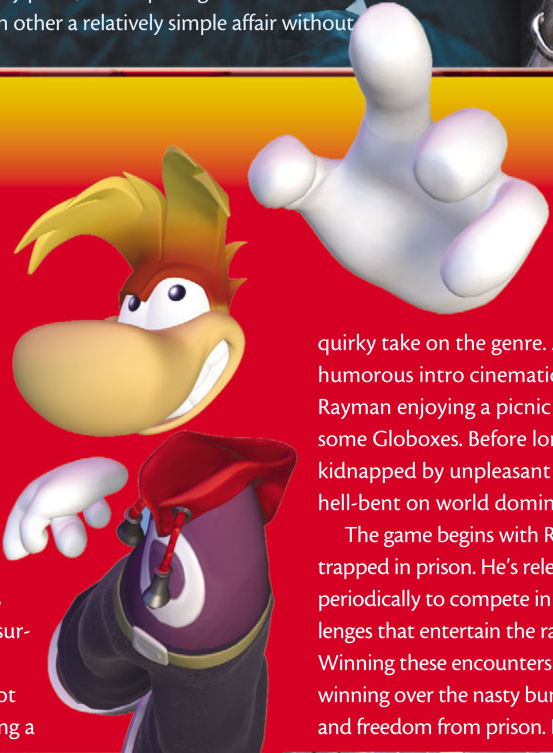
Not The Platformer You Remember

-by Dr. Malaprop

$19.99 (PC-CD, Download); $39.99 (PS2); $49.99 (Wii, 360)

ESRB: (E)veryone • Ubisoft Entertainment

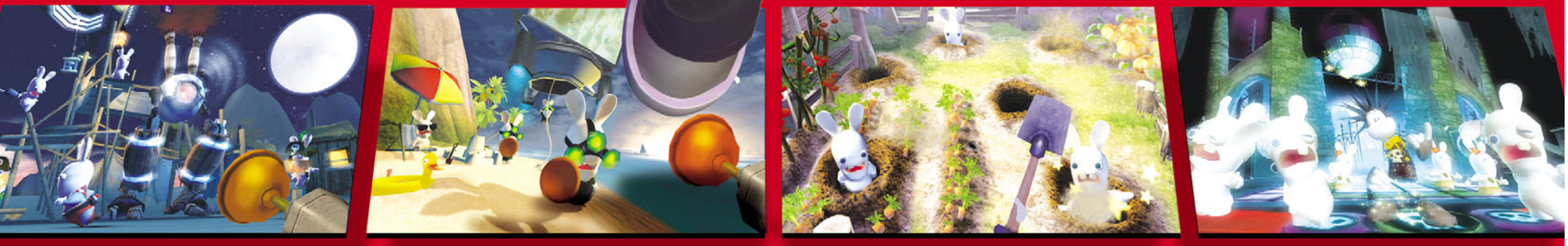
raymanzone.us.ubi.com/ravingrabbids



Those of you already familiar with Rayman's trademark platform series may be in for a surprise with Rayman Raving Rabbids. Ubisoft has turned its Rayman mascot into a party game not unlike Mario Party, but with more depth, feeding a quirky take on the genre. A humorous intro cinematic shows Rayman enjoying a picnic with some Globoxes. Before long all are kidnapped by unpleasant bunnies hell-bent on world domination.

The game begins with Rayman trapped in prison. He's released periodically to compete in challenges that entertain the rabbids. Winning these encounters leads to winning over the nasty bunnies and freedom from prison. Each challenge is a minigame, and the developers have done an excellent job of maximizing the Nintendo Wii's shake-and-wave controllers innovatively. The Wii version of Rabbid is the definitive version to own. We tested out gameplay using the keyboard/mouse as well as the 360 Wireless Controller, and both worked very well. However, anyone that experiences the game on the Wii first will almost certainly notice a diminished experience PC-side.

Still hung up on the new Rayman not being a platformer? We hear you, but it's time to get over that. Rayman Raving Rabbids on the Wii succeeds as an accessible-for-all-ages and fun-to-play title. ▲



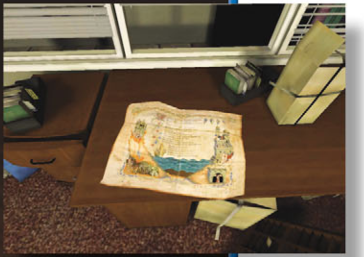
Broken Sword 4 Has Arrived

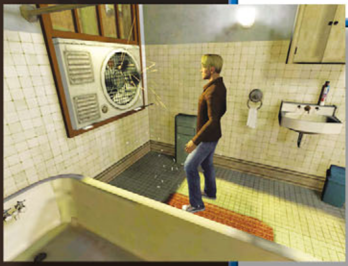
-by Dr. Malaprop

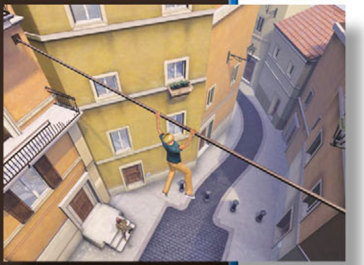
$29.99 * ESRB: N/A • Dreamcatcher Interactive

www.adventurecompanygames.com/tac/secrets_of_the_ark/index.html

Preparation for this review involved consecutively playing through the Broken Sword adventure series dating back to the 1996 original. The first two can be played using the ScummVM emulator, and the third is native to the PC and Xbox.







Secrets Of The Ark returns us to the likeable George Stobbart, now on hard times as a bail bondsman in New York City. As the game begins, George returns to his office and finds Anna Marie in need of his assistance with unraveling the mystery of an ancient family manuscript. With the Mob on their tails, George and Anna set off to get the manuscript back, which unlocks the typical Broken Sword storyline (the title should give you a hint). Nico (from the previous games) is introduced well into the game, and until she joins the story, Secrets Of The Ark feels like a Broken Sword knock-off adventure. The puzzles are linear and mostly logical with the occasional leaps of logic that will require you to dig up some hints. We do like the way the game balances time limits during certain real-time events to build tension without the frustration. The first hour or two drags, but show some patience and we think the plot will eventually suck you in.

Direct movement via the keyboard feels imprecise and unnatural, but fortunately the mouse controls work far better. It's difficult to understand why gamepad support, available in the last title, is no longer present. Graphics look better than they have in the past BS games, but there are animation and art details that don't hold up well when compared to more recent adventure games. The last three games in the series continue to retain a certain charm, a soul if you will, and that seems to be missing in the fourth installation of the series. However, anyone who's played the previous three games will not want to miss out on the continuing adventures of George and Nico. ▲

Logitech G25 Racing Wheel

Lord Of The Circuits

$299.99 (WinXP; PS2)
ESRB: N/A
Logitech
www.logitech.com
CPU Rating: ●●●●●

The Microsoft racing wheel's (reviewed last month) excellent build quality is usurped by the Logitech G25, which rules PC and PlayStation 2 racing game circuits. The hand-stitched leather and stainless steel combo that makes up the G25's dual-motor, force-feedback steering wheel, six-speed shifter, and sturdy racing pedals ushers in a superior suspension of disbelief. In-game, the entire package is precise and tracks very accurately. You'll even find that the brake pedal requires more force than the gas pedal—just like in real life. The wheel will give you reason to curl dumbbells, owing to its powerful and balanced reactions. The G25 kit is obviously meant for the PC: It clamps easily to a desk but lacks the 360 Wheel's couch-friendly ergonomics. The G25, however, is the kit you'd be proud to attach to your PC gaming race frame.

By comparison, Microsoft's (mostly) wireless wheel jumps seamlessly between the 360 and Windows (with Vista driver support forthcoming). The G25's Web site, however, contained no information on upcoming Vista drivers, but we'd be hard-pressed to believe that Logitech doesn't already have some in development. Microsoft's offering is excellent if you're big on racing on your 360 and PC, but the Logitech G25 is the winning choice for any car racing/sim aficionado that desires the best racing experience. We've yet to see better at this price. ▲

-by Dr. Malaprop

Xbox 360 Wireless Gaming Receiver For Windows

Paving The Way To Cordless PC Gaming

Microsoft's Games For Windows branding requires games to support the Games Explorer, Parental Controls, and the Xbox 360 Controller (from the beginning of a game until exiting to the Desktop), among other things. The wired Xbox 360 Controller for Windows has been available for a year but lacks the convenience of the wireless controller. The dongly new Xbox 360 Wireless Gaming Receiver For Windows changes that.

The installation is simple. Install the software, connect the dongle to a USB port, and depress the handshake buttons on first the dongle and then the controller to wirelessly connect the two. This setup has great potential, especially as more games begin to support the GFW initiative.

Unfortunately, potential doesn't make up for functionality today. Microsoft should have bundled software to create custom profiles for nongamepad-supported titles—meaning most older games. We got around this irritation by using the Pinnacle Game Profiler ($19.95 after 30 days free; www.pinnaclegameprofiler.com). The game profiler works as it should and greatly improves your experience with older titles, but it should have been made available with the driver. ▲

-by Dr. Malaprop

$19.99 • ESRB: N/A
Microsoft
www.xbox.com/en-US/hardware/x/xbox360wireless gamingreceiver
CPU Rating: ●●●●

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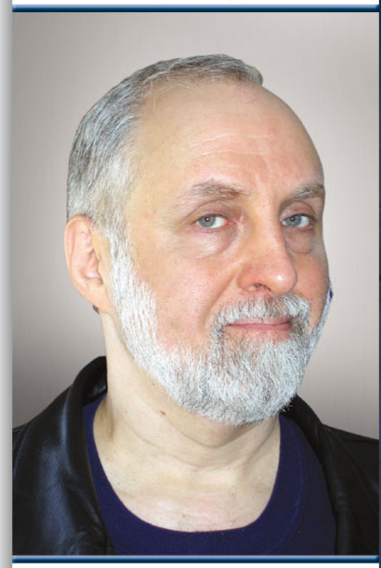
Tune In To . . . Television!

by Barry Brenesal



Barry Brenesal has written more than 1,000 published articles and reviews on electronic technology since 1987. His first personal computer was a Radio Shack TRS-80 model 100. It was last seen functioning as a boat anchor.

I've a confession to make. I haven't watched television in 14 years. This doesn't mean I'm an enemy of what noted playwright Paddy Chayefsky once called "democracy at its ugliest." I can still remember watching the original run of "The Honeymooners" as a separate series in 1955 and the first television release of "The Wizard of Oz," both on a 1952 Remington in a cherry wood cabinet as large as a modern kitchen island. The smooth tuning dial (no locked stations) had to travel a huge distance between channels 6 and 7, where you could watch and hear static, save for the occasional radio station as the years wore on—because that portion of the broadcast band eventually became FM.

But contrary to popular notions, television didn't get its start in the decade following WWII. The first TV stations were up and running during the 1920s, with more than a dozen in operation in the United States by 1930. Sets during this period were mechanical systems with tiny screens that only displayed 30 to 60 lines per frame. (By comparison, the current U.S. standard is 525 lines per screen.) A swiftly rotating metal disk in front of a neon tube reproduced the images, which suffered from horrible resolution but must have been exciting when they were the cutting edge.

There are many who have claimed the title of Television's Inventor. The first American to do so was Charles F. Jenkins, who declared he had produced mechanically televised moving images in 1923, though their first public demonstration wasn't until 1925. He preferred calling his product "radiovision," and he licensed W3XK, a shortwave transmitter that began broadcasting these images in 1928. The radiovision receiver his company sold for between $85 and $135 was a radio set with an attachment for visual display. It projected a 48-line frame on a 6-inch square mirror.

At roughly the same time, Scotsman John Logie Baird was working on his own mechanical television. He televised a human face in 1925 and sent it via transatlantic signal in 1928. In 1930, the BBC used his 30-line system to broadcast sound and images. Although inexpensive from an engineering perspective, its resolution was considered crude even by 1932 standards. The BBC ran a competitive trial in 1936 between a 240-line Baird mechanical system and a 405-line Marconi-EMI electronic system. The electronic system won, and the BBC switched over.

Although Baird's continued advocacy of mechanical television proved to be a bad strategic move, he was a brilliant innovator. In 1928, he unveiled prototypes for color, infrared, and stereoscopic television. He also made visual recordings of his early television experiments, since the frequencies Baird used and the relatively small bandwidth of 30 lines per picture frame made that possible on audio discs of the period. (Several of these have recently been restored. Although you can't see the animated images online, you can see a succession of stills from two of them at www.tvdawn.com/tvimage.htm.)

Electronic TV was initially hampered by a lack of a suitable transmitting device, but this problem was solved by U.S. inventor Philo T. Farnsworth in 1927. He subsequently got into an epic legal battle with RCA, which claimed its employee Vladimir Zworykin had filed a patent on a similar system as early as 1923. Zworykin stated in court that he'd tried his version years before Farnsworth but provided no evidence. RCA and Zworykin lost in court but won the publicity battle that wrote pop history. And the farsighted Farnsworth? He showed up in 1957 on the game show "I've Got A Secret," stumping the panelists about having invented electronic television. His prize was $80 and a carton of cigarettes.

The 1930s were boom years for TV; a German 180-line system debuted in March 1935, and a French model a month later. A 1937 hobby booklet survives, published in Moscow, detailing how to build a mechanical TV receiver. The booklet's front cover shows a drawing of a boy at work on the device in the center of a screen that also displays an airplane at its apex. Presumably the latter was a model, although if it were full-sized that might explain certain problems experienced by the Soviet air force during WWII.

Next month, we'll do a second part on postwar television, the marvels of color, and my father's stock market Waterloo. Until then. ▲

I've a confession to make. I haven't watched television in 14 years.

Wax nostalgic with Barry at barry@cpumag.com

Software Tips & Projects

Vista's First Toys

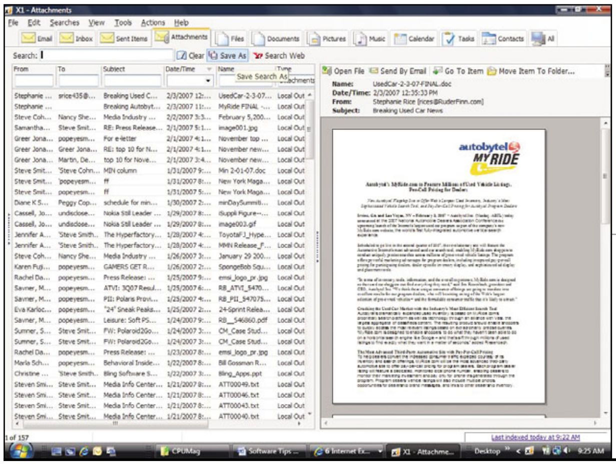
Some of you have had a couple of months now to play around with Windows Vista, and many others are still contemplating the upgrade. We have already covered the first things to do after upgrading and an initial round of tips. At the same time, we don't want to ignore the groundswell of programs and revisions that accompany every new OS release. Now that Vista is out in the wild, we're starting to see third parties (and Microsoft) release tools and applications that make the OS easier to live with. To be sure, many of the old standby utilities continue to work in Vista, so we'll focus on the newest programs and add-ons that leverage specific qualities of Vista. (*NOTE: In a couple of cases, these apps were so bleeding edge that we didn't get to test them ourselves, but they should be available as you read this.*)

Yahoo! Messenger

Still in internal beta testing as we went to press, the public release of Yahoo! Messenger (messenger.yahoo.com/windowsvista.php) should be available by the time you read this. It will include cool new features such as dragging and dropping your open chat windows into a single tabbed window and being able to track when your contacts post new Flickr images. The new IM manager is tied to Yahoo! Sports Fantasy Football league, so you can track all of the activity going on among your contacts in its own skinned window. Of course, like many of the Vista programs we see coming down the pike, the new Messenger will use the Vista Sidebar. You can actually drag one of your contacts onto the Sidebar and Vista will notify you when they're available without even opening the IM client.

Yahoo! X1 Enterprise Client Beta

Many people don't know about this specialty product for the enterprise, but it's several degrees beyond the old Yahoo! Desktop Search. The portal has partnered with X1 to offer a supercharged tool that is free. The X1 Enterprise Client (www.x1.com) for business users is a high-level tool that now works under Vista and supports Internet Explorer 7, the latest Office 2007 file formats, and the new version of Outlook.


X1 - Attachments
File Edit Searches View Tools Actions Help
Email Inbox Sent Items Attachments Files Documents Pictures Music Calendar Tasks Contacts All
Search:
Clear Save As Search Web
From To Subject Date/Time Name
Open File Send By Email Go To Item Move Item To Folder...
1 of 157
Last indexed today at 9:22 AM

Yahoo! and X1 team up for a new Desktop Search-like tool they've upgraded to handle Windows Vista, Office 2007, and Internet Explorer 7.

Transfer Made Easy

Another little-known add-on to Vista is the Easy Transfer tool. It comes with every version of Vista. We used this utility in the late release candidate builds and found it very helpful, if not always perfect, in transferring system settings, folders and files, some email settings, and even Internet Favorites from our old WinXP machine to the new Vista one. We should offer the caveat that not everything successfully migrated in our tests, so make sure you back up your vital data in the usual way before overwriting any hard drive with your old OS on it.

We won't go through the process of using Easy Transfer because it's fairly self-explanatory once it's running on Vista, but

WinXP Tip Of The Month

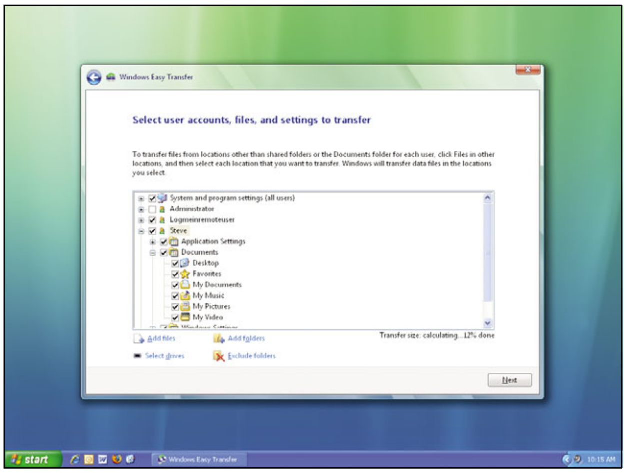
Like most people, you may copy pieces of Web sites to a word processor when you research online. And, like most people, you probably have to battle all of the codes and images that end up on your Clipboard when you block a section of most sites. To make things easier, there's a freeware product, PureText (www.stevemiller.net/puretext), that strips images and typeface codes from anything on your Windows XP Clipboard. Load it into memory, and the program lets you assign its paste command to a key combo such as Windows key-V so that the current contents of your Clipboard will paste into an application as unformatted text—and only text. ▲

Registry Tweak Of The Month

This month we would like to reiterate a tip we offered back in our June 2006 issue of *CPU* on page 97 for reducing the lag when activating submenus off of the Start menu. We mistakenly pointed readers to the key for the previous tip. Here's the right location for speeding up Start submenus: In the Registry editor, go to HKEY_USERS\.DEFAULT\CONTROL PANEL\DESKTOP. Double-click the MenuShowDelay value, type 300 in the Value Data field, and then reboot. Adjust the number up or down to suit your tastes. ▲

there are a few things you should note. To find the Easy Transfer tool in Vista, type **easy** in the Start search box and press ENTER. (You'll also need to put a copy of Easy Transfer on your old WinXP machine in order to transfer the files.) After the initial screens of the tool, you'll see a screen that offers to Start A New Transfer. Choose that option and then choose My New Computer in the next screen for transferring items to your new computer. On the next screen, you can choose to use an Easy Transfer cable. When moving from one PC to another, this is the easiest option, but you'll need to purchase a $40 transfer cable if you don't have one. You can also use a CD or DVD disc to transfer files or go through a network. Whatever path you choose, you need to get the Easy Transfer software onto the old PC, so choose No, Show Me More Options and then on the next screen choose No, I Need To Install It Now. Next, you have the option to copy Easy Transfer to a blank CD or a USB flash drive. Vista will walk you through the process of copying Easy Transfer to removable media. (Alternatively, you can download Windows Easy Transfer at Microsoft.com.)

Again, the process of transferring is fairly self-explanatory once you have Easy Transfer up and running on the old WinXP PC. Here's the most important tip for doing this transfer efficiently: Take control of what you're moving from the old to the new PC. Whichever path you choose when running Easy Transfer on the old PC, eventually you'll come to a screen that asks, What Do You Want To Transfer To Your New Computer? To optimize the time and space you need for this transfer, click Advanced Options. This gives you much more granular control over which pieces of the old PC's settings and which files and folders you do and don't move over. This is especially vital if you're using a disc for the transfer. Look to the lower-right corner of the advanced settings window to see a running total of the current size of the transfer. Use the checkboxes to reduce the load.



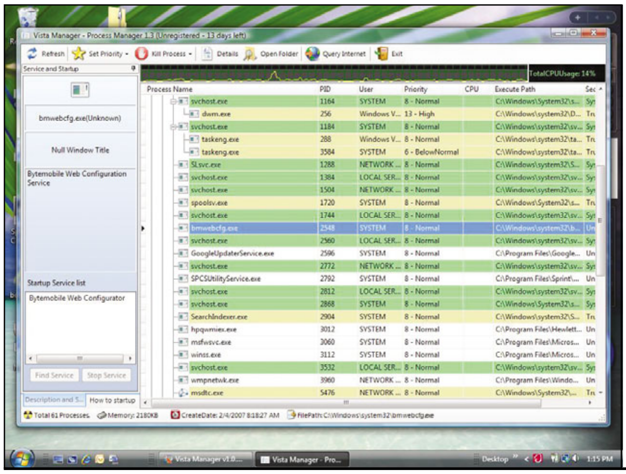
Select user accounts, files, and settings to transfer

To transfer files from locations other than shared folders or the Documents folder for each user, click Files in other locations, and then select each location that you want to transfer. Windows will transfer data files in the locations you select.

- ☑ System and program settings (all users)
- ☐ Administrator
- ☑ Logmeinremoteuser
- ☑ Steve
  - ☑ Application Settings
  - ☑ Documents
    - ☑ Desktop
    - ☑ Favorites
    - ☑ My Documents
    - ☑ My Music
    - ☑ My Pictures
    - ☑ My Video

Transfer size: calculating...12% done

Vista's Easy Transfer tool can move old system files and folders from a WinXP to a Vista PC, but be sure to tweak the advanced options to make the package more manageable.



bmwebcfg.exe(Unknown)

Null Window Title

Bytemobile Web Configuration Service

Startup Service list

Bytemobile Web Configurator

Process Name	PID	User	Priority	CPU	Execute Path	Sec
svchost.exe	1164	SYSTEM	8 - Normal		C:\Windows\System32\s...	Sy
dwm.exe	256	Windows V...	13 - High		C:\Windows\system32\D...	Tr
svchost.exe	1184	SYSTEM	8 - Normal		C:\Windows\system32\sv...	Sy
taskeng.exe	288	Windows V...	8 - Normal		C:\Windows\system32\ta...	Tr
taskeng.exe	3584	SYSTEM	6 - BelowNormal		C:\Windows\system32\ta...	Tr
SLsvc.exe	1288	NETWORK ...	8 - Normal		C:\Windows\system32\S...	Sy
svchost.exe	1384	LOCAL SER...	8 - Normal		C:\Windows\system32\sv...	Sy
svchost.exe	1504	NETWORK ...	8 - Normal		C:\Windows\system32\sv...	Sy
spoolsv.exe	1720	SYSTEM	8 - Normal		C:\Windows\System32\s...	Tr
svchost.exe	1744	LOCAL SER...	8 - Normal		C:\Windows\system32\sv...	Sy
bmwebcfg.exe	2548	SYSTEM	8 - Normal		C:\Windows\system32\b...	Un
svchost.exe	2560	LOCAL SER...	8 - Normal		C:\Windows\system32\sv...	Sy
GoogleUpdaterService.exe	2596	SYSTEM	8 - Normal		C:\Program Files\Google...	Un
svchost.exe	2772	NETWORK ...	8 - Normal		C:\Windows\system32\sv...	Sy
SPCSUtilityService.exe	2792	SYSTEM	8 - Normal		C:\Program Files\Sprint\...	Un
svchost.exe	2812	LOCAL SER...	8 - Normal		C:\Windows\system32\sv...	Sy
svchost.exe	2868	SYSTEM	8 - Normal		C:\Windows\System32\s...	Sy
SearchIndexer.exe	2904	SYSTEM	8 - Normal		C:\Windows\system32\S...	Tr
hpqwmiex.exe	3012	SYSTEM	8 - Normal		C:\Program Files\Hewlett...	Un
msfwsvc.exe	3060	SYSTEM	8 - Normal		C:\Program Files\Micros...	Un
winss.exe	3112	SYSTEM	8 - Normal		C:\Program Files\Micros...	Un
svchost.exe	3532	LOCAL SER...	8 - Normal		C:\Windows\system32\sv...	Sy
wmpnetwk.exe	3960	NETWORK ...	8 - Normal		C:\Program Files\Windo...	Un
msdtc.exe	5476	NETWORK ...	8 - Normal		C:\Windows\System32\...	Tr

Total 61 Processes. Memory: 2180KB CreateDate: 2/4/2007 8:18:27 AM FilePath: C:\Windows\system32\bmwebcfg.exe

The new Vista Manager from Yamicsoft not only peers into the multitude of background processes Vista requires, but it also helps you identify intruders and needless resource hogs.

Vista's First Manager

No doubt the Vista optimization and tweaking tools will pour from third parties in coming months, but among the first and most polished we've seen is Yamicsoft's Vista Manager (www.yamicsoft.com). The program does all of the usual tweaking tasks such as turning on and off the new Taskbar thumbnails and removing default items from the Start menu and Taskbar. But it also has a comprehensive Process Manager that helps advanced tweakers identify and stop background tasks that may be undermining performance. If you highlight a process in this tool, a description window to the left tells you its function so you can determine if it's vital to Windows. The Query Internet button runs the process' name through Google to look for further clues.

We should also mention that there are several new Vista tweakers that came to market as we went to press, including Tweak VI (www.totalidea.com) and a new version of the Vista Start menu (www.vistastartmenu.com). ▲

by Steve Smith

Infinite Loop

Cuddly, Caterpillar-Like Robots?

Because today's hard-bodied robots aren't flexible, researchers at Tufts University are attempting to develop new softer, almost cuddly, robots with the help of caterpillars. These soft-bodied robots could be useful in many situations in which today's robots are simply inadequate, such as getting into tight places or helping out with risky surgeries—or cuddling up with you for a nap. ▲

Source: www.sciencedaily.com/releases/2007/01/070128105355.htm

Warm Up To Penguins

Office Alternatives: Pipedream Or Practicality?

Whether you believe that Linux (or some other OS) can replace Windows or not, the bigger issue is whether you can get any work done on that OS. Microsoft's Office productivity suite products have long been the unofficial standard for getting things done at home and at work, but can they be replaced with open-source alternatives?

Before you can replace Office, you have to know what it is, so the first step is a quick review of what goes into the Office suite. Then, we'll take a look at three open-source alternatives to office productivity, OpenOffice.org, GNOME Office, and KOffice, and see how they stack up. We'll look at the build-your-own-suite alternative for getting best-of-breed applications. For a different approach to providing software services, check the "Services, Not Software" sidebar, which highlights some of your choices. Finally, we'll consider some of the benefits of sticking with Office and how to decide if that's the best path for you.

What Is Office?

Buying Microsoft Office these days can be more complicated than buying a car: Do you purchase the retail, OEM, academic, or volume licenses? Pre-installed or do it yourself? Office Basic, Standard, Ultimate, Professional, or what? Table 1 shows what you get with each of the packages.

Excel, Word, and PowerPoint are included in all versions of Office and compose the three fundamental productivity applications: spreadsheet, word processing, and presentations. At a minimum, any Office alternative would have to provide these three applications. Likewise, you'll need to find an Outlook alternative for email, calendaring and scheduling, and contact management. Other general productivity applications include Access for database management and reporting and Publisher for desktop publishing.

Some Office applications included in packages are trickier to replace because they are either less general, such as Accounting Express (accounting) or InfoPath for creating and deploying electronic forms, or more vague in their purpose, such as Groove for collaboration and the OneNote "digital notebook" for gathering and organizing text, pictures, digital handwriting, and audio and video recordings, into a digital notebook on your computer. Another application, Communicator, will, when released later this year, offer a unified communications client for instant messaging, voice, and video.

Office applications that are *not* included in any of the prepackaged suites—but that have obvious open-source alternatives—include SharePoint Designer (replacing FrontPage for Web design), Project (project management), and Visio (flowcharting and graphic visualization).

The bottom line is that the simple task of replacing Office is not so simple: Office comprises over a dozen applications, more or less, and many but not all of them are available packaged together. That doesn't mean it's difficult to give Office the boot, as long as you're ready to do your homework.

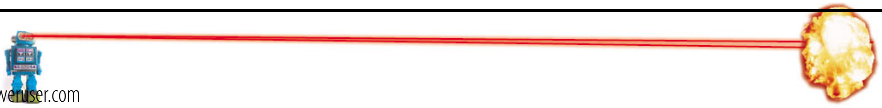
OpenOffice.org

The best-integrated Office alternative, OpenOffice.org (OO.o), is also the most versatile, as it can run on Windows, GNU/Linux, Sun Solaris, Mac OS X (under X11), and FreeBSD. OO.o's core applications include:

- Writer for full-featured word processing

Table 1:
Depending on which version you choose, you get up to 10 Office applications.

	Office Basic	Office Home and Student	Office Standard	Office Small Business	Office Professional	Office Ultimate	Office Professional Plus	Office Enterprise
Access 2007					x	x	x	x
Accounting Express 2007				x	x	x		
Communicator 2007							x	x
Excel 2007	x	x	x	x	x	x	x	x
Groove 2007						x		x
InfoPath 2007						x	x	x
OneNote 2007			x			x		x
Outlook 2007	x	x					x	x
Outlook 2007 with Business Contact Manager				x	x	x		
PowerPoint 2007		x	x	x	x	x	x	x
Publisher 2007				x	x	x	x	x
Word 2007	x	x	x	x	x	x	x	x



- Impress for multimedia presentations (a la PowerPoint)
- Math, a GUI/interactive equation editor
- Draw for diagramming and illustrating;
- Calc spreadsheet
- Base for creating and manipulating databases

OO.o is fairly well tied together and lets you open new files of any type from any of the component applications' menu bars. It even includes an API and an IDE (integrated development environment) for OpenOffice.org Basic.

Office users should find most of the applications familiar, at least, as the OO.o apps are all designed to be compatible with the industry's big dog. In addition to reading and writing competitive file formats, OO.o is the first suite to use the OASIS OpenDocument Format (ISO 26300) as its native file format. (See the "Cross Suite Interoperability" sidebar for more information about file formats.)

OO.o is available for download at www.openoffice.org, as well as being incorporated in most mainstream Linux distributions. International users should note OO.o's support for most Western languages; CJK (Chinese, Japanese, and Korean) languages; and for languages that require CTL (Complex Text Layout), such as Arabic, Hebrew, and Indic languages, and others.

GNOME Office

More loosely coupled is the GO (GNOME Office) suite, called GO for Linux (www.gnome.org/gnome-office), which includes the time-tested AbiWord word processor, the Gnumeric spreadsheet, and the GNOME-DB database toolkit. (And that's it.) As for cross-platform functionality, AbiWord is available for Mac OS X and Windows, as well as Linux, but Gnumeric is available for Windows and Linux only. If you are running Linux, you don't have to use GNOME as your desktop environment, but it may make things a little easier.

KOffice

The KDE (K Desktop Environment) comes with its own productivity suite called KOffice (www.koffice.org). It integrates nicely with the KOffice Workspace (also known as KOffice Shell), from which you can open and work on almost any kind of document or file within a single workspace window. Included applications are the word processing/spreadsheet/presentation applications KWord/KSpread/KPresenter, as well as Kexi (integrated data management application), Kivio (diagrams and flowcharts), Karbon14 (vector-based drawing), Krita (painting/image-editing), KPlato (project management), KChart (chart drawing), KFormula (formula editing), and Kugar (business reporting).

KOffice is purely designed to run on platforms with KDE: that means Linux and *NIX variants only. And although some pieces of KOffice may function under GNOME or other desktop environments, they'll work best when run under KDE.

In addition to the KOffice applications, there is a much larger population of KDE-centric programs that are designed to work together in the KDE environment; pretty much any open-source application that runs on Linux and starts with (or features prominently) the letter "K" is likely to be a member of this family. KDE and related applications are incorporated into most Linux distributions these days and can be downloaded from www.kde.org.

Services, Not Software

The model for office productivity applications for 25 years or more has been simple: shrinkwrap software, sold to be installed on individual computers. That's changing, though, as more users are finding online applications that allow them to create and edit documents, spreadsheets, databases, and images.

Ever since Google started offering services such as Gmail, there's been speculation about the possibility that the search engine giant might try to go head-to-head with Microsoft and turn the Web into the desktop. Google has systematically denied those rumors over the years, but last year's announcement of Google Docs & Spreadsheets, a free service that lets you create and edit word processing documents and spreadsheets over the Web and specify who else can view or edit those files, added fuel to the fire.

Although such an approach gives an organization greater control over software administration and backup chores and flexibility for users who can access their data from any Web-connected PC (as well as reduction in system management overhead), it does have drawbacks. These include a lack of control over potentially sensitive data, the difficulty of implementing fully functional application software with comprehensive feature sets over the Web, and a reliance on network connectivity to get anything done. ▲

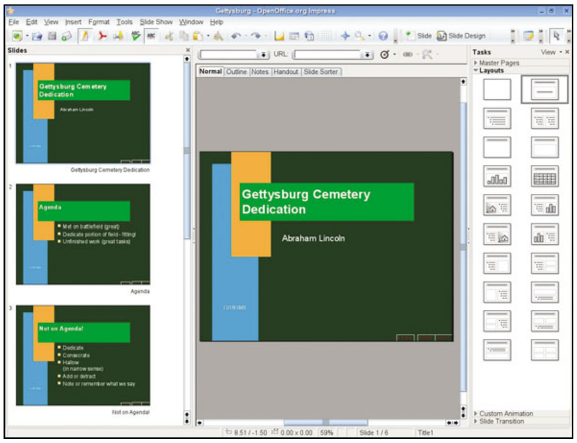
Missing Pieces

You may be asking, "What about Outlook (or Publisher, SharePoint, etc.)?" The developers behind the three major open-source office suite alternatives don't presume to know what exactly you need in terms of a Web/HTML project editor, desktop-publishing package, email/calendaring/scheduling client, or even an accounting package, so they leave those blanks to be filled by others.

For example, if you're looking for an Outlook-like client, look no further than Mozilla Thunderbird (for Windows, Mac, or Linux) or Evolution (for Linux only). If you have special email/calendaring/scheduling needs, you can always search the open-source world for alternatives that are a better fit for you.

Need a Web development system? Instead of SharePoint Designer, why not investigate Nvu (www.nvu.com), a Web - authoring system that runs on Windows and Mac, as well as Linux? Or you could check out cross-platform and lightweight HTML editor Mozilla SeaMonkey (www.mozilla.org/projects/seamonkey), cross-platform Web development studio Bluefish (bluefish.openoffice.nl/index.html), or the KDE-aligned Web editor for Linux/*NIX/Mac OSX, Quanta Plus (quanta.kdewebdev.org).

Open-source options for accounting software are generally not as strong as for



Open Office.org's Impress is just one piece of one of the most popular open-source office suites. KOffice's KPresenter is another open-source presentation application. OO.o and KOffice as a whole represent some of the best office suites the open-source world has to offer.

some of the other applications you might find. After all, how many programmers yearn to code accounting tools, especially when they can do any number of other, more glamorous types of programs? Even so, you can try out GnuCash (www.gnucash.org) for Linux/*NIX and Mac OS X or Grisbi (www.grisbi.org) for Windows and Linux.

If you're looking for publishing tools, look to some of the most important publishing software in the business, starting with the gloriously arcane TeX and culminating with any number of much easier-to-use DTP tools, some of them TeX-based, including cross-platform desktop publisher Scribus (www.scribus.net) and TeX-based document processor LyX (www.lyx.org).

Build Your Own Productivity Suite

Maybe it's not the same as having a fully integrated set of applications, but the fact is that any productivity suite is simply an agglomeration of applications. Almost any current Linux distribution offers a comprehensive selection of applications of all types. For example, my desktop currently includes the following word-processing packages: KWord, OpenOffice.org's Writer, AbiWord, Ted (a lightweight word processor), LyX, Kile (KDE Integrated LaTeX Environment, essentially a front-end for TeX document processing), and Scribus. I have four choices for spreadsheets; eight database front-ends, report writers and similar tools; five flow-chart programs; and so on.

The advantage of this approach is that, of course, you get to pick and choose the applications that best meet your needs for functionality, usability, and features.

Choosing The Status Quo

How do you decide whether to switch from Office? The first step is to figure out your current needs. You may be using just two or three Office applications, even though you have Office Ultimate installed. At that point you might be able to save a bundle simply by moving to the less-fully featured version of Office Basic.

Other issues to consider include:

- **Who supports your application?** If you use a support service of any type, whether an internal corporate IT service or a third-party provider, you will have to evaluate the degree to which that support is necessary to your ability to use the application.
- **Are you able to support yourself, using a new application?** You won't be completely alone with most open-source programs, as the more popular ones come with their own online support resources that can provide answers to most questions, and the user community is usually willing to help out if your question is a new one.
- **Does your organization have an investment in application-specific customization or programming?** Many templates can be directly imported for use by open-source applications, but that is not always the case. Likewise, there are several programs that rely on macros and application-specific programming languages that may not be easy to port to open-source solutions.
- **Will you require retraining?** New applications may be significantly different from what you're accustomed to, requiring some investment in training materials or courses. However, keep in mind that if you haven't yet upgraded, Office 2007 applications will also be at least somewhat different and may also call for additional training.
- **What hardware will you be using?** Although Microsoft's latest Office 2007 release may require hardware upgrades, most of the open-source alternatives cited in this article will run on PCs that would be considered incapable of running Vista or Office 2007.

Overall, the switch to open source is easiest for individuals and small businesses. The question of which office suite to use in a larger organization often raises more complex issues related to legacy systems, interoperability, and corporate requirements. ▲

by Pete Loshin

Infinite Loop

The Machines Are Coming

Robots are on the verge of taking over the world and enslaving us all. And humanity's ignorance is their greatest ally.

It sounds like a cheesy sci-fi movie pitch, but Robowatch (www.robowatch.org) claims that this is happening today. The Web site's Proposal page features a plea to the United Nations for "sanity and survival in the coming Cybot Society." The site goes on to claim that mankind is a "vanishing species." If you're still a skeptic, then check out RoboCup (www.robocup.org) to see how robots will beat us at soccer by 2050. ▲

Source: www.robowatch.org; www.robocup.org

Shavings From The Rumour Mill

by Mike Magee

Future CPUs Will Easily Power Vista

Microsoft Vista's arrival was met with some indifference by the world, judging from the reviews I've read, but continues to be one of the most expensive components in a PC aside from top-end graphics cards, monitors, and the like.

But it hasn't been met with indifference by people who have attempted to upgrade only to discover drivers are still in beta while some devices will never be supported.

Can I be alone in thinking that there's something a bit odd about this? After all, the OS has been five years in the making, and the high-level architectural decisions were made long ago. Pretty much everyone is agreed that it's, well, pretty, but not even Microsoft made an enormous song and dance about it. Like it or don't like it, next time you buy a PC with Windows it'll be a Vista one you'll get.

I am, generally speaking, pro-Microsoft. While the firm can be criticised for some of its business practices, its operating system has brought a degree of functionality to the PC in the last 20 years which I applaud.

In the way of these things, the good thing is there's some nifty hardware coming along to mop up the extra overhead of the OS. Intel, for example, is promising that early next year there will be 45nm Yorkfield and Wolfdale quad-core processors, while all Core 2 Duo E6000 CPUs will have 4MB of level two cache in this second quarter. When its 45nm Penryn processor launches, it will only consume 35 watts. Intel will introduce faster versions of its Extreme QX6700 throughout this year, while its E2000 family of 65-watt dual core chips will be introduced in the second quarter of this year. The entire i865 chipset range will wave farewell in June; it's reached the end of its working life and needs to be put out to grass.

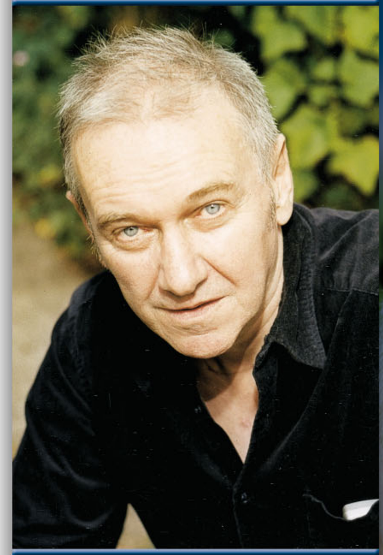
By the time you read this, Intel will have introduced its Santa Rosa notebook platform, dubbed the Centrino Pro, and it's already promising another version using Penryn for next year. Code-named Montevina, it includes the company's Trusted Execution Technology (TXT) and uses the Cantiga chipset.

While AMD has been somewhat left in the shade for the last 10 months during Intel's next-generation blitz, most people are predicting that the introduction of its Barcelona core, set for around June and in production probably in August, will help it to claw back some of the ground it has lost.

As I write this, ATI is close to bringing its R600 graphics technology to the market with early birds reckoning it will give a performance edge to what's now an AMD division of course. Sources inside AMD tell me that the company's integration is proceeding pretty smoothly, which given the competitive nature of this business has got to be good news. However, there are no signs of the price war between Intel and AMD ending any time soon and while this may be good news if you're buying or building a PC, in the long run it must take its toll on the players.

But to show the extremes the market has reached, I had a call from a guy in Texas the other day who wants to build the biggest and best machine ever, with quad cores, very high-end graphics cards, a super-duper case with a huge PSU, and the rest. He reckons it will probably cost him between $15,000 and $20,000. Over at the Dell site you can get a pretty reasonable multimedia machine for about $500. The market's gone nuts.

So the Vista launch came and went, and Microsoft's already talking up its next operating system, code-named Vienna, but with little indication of what that might bring to the party in 2009 or 2010 if the software giant makes that date. It's just as well that the hardware vendors, generally speaking, keep much tighter deadlines than the software firms because let's face it: We need the additional processing power for each generation of Windows. ▲



Mike Magee is an industry veteran. He cut his teeth on ancient products like the Dragon and the Japanese PC platforms long before the IBM-PC won. He worked for a corporate reseller in the mid-'80s and saw the Compaq 386 sandwich box and every GUI known to humankind. Mike decided that the way to go was the Interweb around 1994 after editing PC mags in the late '80s and '90s. A co-founder of The Register, Mike started the chip-driven INQUIRER (www.theinquirer.net) in 2001. He has contacts from top to bottom in the business, spanning the entire chain, who help him root out interesting rumours and speculation.

> So the Vista launch came and went, and Microsoft's already talking up its next operating system, code-named Vienna

Send rumours to "Mad Mike" Magee at mike@cpumag.com.

The History Of Voodoo

As I'm sure my peers can attest, I receive countless emails from people asking how I got started in this business. This month I thought I would share some of our humble beginnings, some cool stories, and a bit on how we set off in our current direction. I do so in the hopes that after you read this, some of you may feel inspired to go do something you love, either within your organization or on your own.

Shortly after graduating from high school in 1991, I enrolled at Mount Royal College in Calgary. Three months in I realized that the computer science courses were lacking in substance. For me, learning WordPerfect for DOS as a prerequisite was not inspiring. I was also attempting to take some marketing courses, but my marketing professor was a bit of a jerk.

I remember it like it was yesterday: I was quite bored after high school, and sometimes I would roll out of bed at 11 a.m. with no desire to go to class. Luckily, my fiancé inspired me to take a major risk—I started Voodoo with $1,500 on a credit card and an $85 ad in the newspaper. After selling eight computers in my first week, I simply stopped showing up to classes. I didn't even bother to drop out.

After a year or so, we landed a successful workstation contract with a large marketing company. I then acquired a heritage home more than a century old in downtown Calgary with a small shed in the back. We renovated the site and restored the old character of the building. We ripped the old kitchen out and built a new manufacturing space which we coined the "Quote Kitchen." Even though we had to cram way too many people into our old 900 square-foot house, it was an incredibly cool place to work.

The guys at Voodoo would hang out together and play games until the wee hours of the morning. It started with games like Wing Commander, and as the years went on, a new game called Command & Conquer took over.

We even had an official Command & Conquer trophy called "The Champeen." The minute the last customer left the building each day we would lock the doors and the tournaments would begin. It was an unbelievable culture really; we spent the days working and servicing customers, and during the downtime, we would play the stupid game. The winner of each competition claimed temporary ownership of The Champeen and the right to talk as much smack as he liked.

Every once in a while something would come along and tear us away from C&C, like the Friday when one of our techs built a potato launcher out of some leftover PVC pipe and rough materials we had kicking around the tech shop. My wife was working as a hairdresser, so after work we went to my house and raided her cabinet for hairspray to ignite the launcher. Then about 9 p.m. we grabbed a bag of potatoes from the local grocery store.

We started on the driveway, launching potatoes 500 yards across the street into the fence. It sounded like a bazooka, and what started as an experiment ended up being a giggle fest with half a bag of potatoes splattered all over the place. Then we went downstairs to play some games for a couple of hours, until all of the sudden there was banging at the door, and the phone was ringing. It was the police.

The police requested that all of us exit the house with our hands up. They asked if we were shooting something downstairs but we explained that they were just hearing a video game. My wife, bless her, is the most understanding person in the world. She was the last to leave the house, and as she walked outside with her housecoat on and her hands up, the officer outside looked at me, shook his head, and said, "Man, you're gonna be in the doghouse for a long time."

In the end, the police merely had a good laugh and confiscated the potato launcher, but like many others, that day has become legend at Voodoo.

Over the years we built some lifelong friendships and a camaraderie that's by Rahul Sood

impossible to explain. Many of the people who worked at Voodoo during the early days moved on, and some of them are more successful than we could ever have dreamed. I often hear people say their days at Voodoo were some of the best days they ever had and certainly the most fun.

Voodoo has always been an inspiring place to work, but things weren't always easy. Shortly after 1999 my brother joined the team to help us get to the next level. Things were out of control, and at the time I was the go-to guy for everything. Having Ravi on board allowed us to focus on what we loved best—building a better machine. We slowly acquired a well-rounded core team to bring focus to the brand. Eventually we acquired the entire corner of our block, which included a second house.

We like to think that Voodoo was built on a foundation of excellence, albeit not without challenges. Over the years we earned countless awards throughout the industry. We were pioneers, and we built a heritage like few other performance PC manufacturers in the world. Companies like Falcon Northwest and Alienware were always on our radar, and they always kept us on our game.

I probably speak for everyone at Voodoo when I say that I love the brand, I love the team like family, I love the machines, and I love my customers. I am so passionate about this company and the brand that in 2005 I tattooed the Voodoo logo on my leg. Voodoo is our baby.

In late 2004 we realized that there was a ceiling to our growth. More competitors started to jump into the space, and even though we felt we offered some advantages, we couldn't ignore them.

We reached a point where it became a challenge to innovate based on our volumes. Even though we were first to market with certain technologies, vendors would eventually make them available to everyone in order to facilitate volume. We could either follow our competition by going downstream and increasing our volume, or we needed to come up with another strategy to innovate. Thus it made sense for us to partner with a larger company.

I have been a small-business guy since 1991, and as you all know in 2006 Voodoo was acquired by HP. If you have had a chance to read my blog you'll know that prior to partnering with HP, Voodoo had discussions with other companies, as well.

HP is the only PC company with a true heritage of innovation, and because innovation has always been important to us at Voodoo, HP was our No. 1, No. 2, and No. 3 choice.

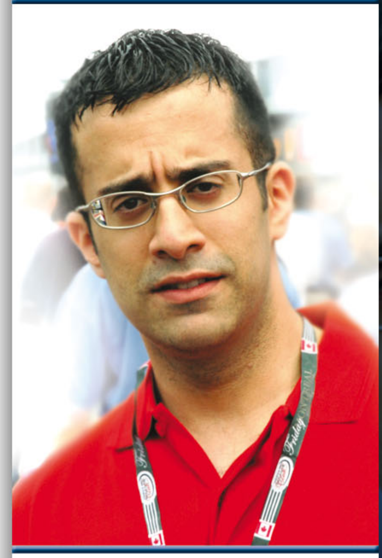
When the acquisition was complete, HP execs Todd Bradley, Phil McKinney, and Paul Campbell joined Ravi and I for a team call to Calgary while we were at the launch event in New York. The team was blown away, they roared in delight, and it was a very moving experience for us.

In January we attended CES, our first official joint event. A typical visit to CES requires a three-hour wait in line just to get your credentials; when you make it to the front of the security line, you must produce countless pieces of ID to prove you are who you are. I was expecting more of the same this year, but the minute I arrived at the hotel I saw an HP desk. Behind the desk was a great guy who said "Oh, are you Rahul? Here's your badge. . . ." That was the first sign that things had changed significantly.

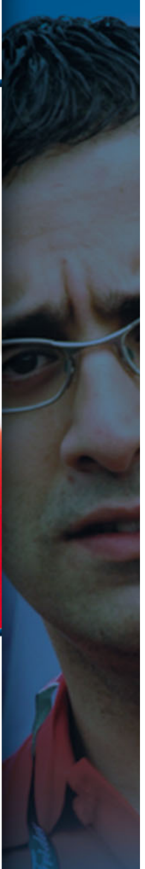
We attended the Pure Party at Caesars Palace. HP had set up an area called "The Voodoo Lounge." Words cannot explain the emotions that went through both Ravi and I as we saw the giant Voodoo banner and the celebration of technology that ensued. It was truly amazing. It's like watching your baby grow up, graduate, get married, and have children all in one day.

There's no doubt that HP has embraced the Voodoo brand. It has given us the freedom to express ourselves and stay true to our roots. The company let us have a separate Voodoo tent at CES, which we affectionately referred to as the "Unofficial HP House of Voodoo."

The honeymoon may be over, but so far things have been quite positive. The camaraderie at HP is amazing, similar to the early days at Voodoo. Yes, it took 15 years to get here, and though it seems like a long time, our team's accomplishments are quite extraordinary. I'm really proud of everyone who had a hand in making Voodoo what it is today. ▲



Rahul Sood's love for computers started at the young age of 11. Much to the shock and dismay of his parents, he ripped apart his brand-new Apple //c and painted it red before turning it on. His parent's dreams of having a doctor for a son were shattered when college drop-out Rahul founded what is now one of the most respected high-end computer companies in the world, Voodoo Computers.



I started Voodoo with $1,500 on a credit card and an $85 ad in the newspaper.

Send your opinions to this opinionated guy at rahul@cpumag.com

Technically Speaking

An Interview With Cory Ondrejka, CTO Of Linden Lab

Cory Ondrejka is CTO of Linden Lab. He led the team that developed Second Life, the Lab's very popular online digital world with powerful user design tools. Prior to joining Linden Lab, Ondrejka worked on defense contracts for Lockheed Sanders and served as Lead Programmer for Acclaim Coin-Operated Entertainment's first internally developed coin-op title.

by Barry Brenesal

CPU: Did Second Life have its genesis in the old text-based MUDs and MUSHes?

Ondrejka: None of the founders of Linden Lab were active players in those games, and we didn't play MMORPGs. Certainly these games existed—you would have had to go to college in a box to not have been aware of them if you were in the technology space—but it wasn't a strong area of interest to us. When I met Philip Rosedale in the fall of 2000, he had left Real Networks and was thinking about what you could do with broadband compression, super 3D, and some interface technology. We met, clicked, and I came onboard to build the team and do most of the heavy lifting on the architecture and software sharing sides.

What was pretty clear at that point was that we were going to build this beautiful, living, ecosystem/forest place that people would go visit: virtual tourism. It wasn't until about a year later, when the first building tools went in, that we had the 'ah-ha!' moment. It was really about giving people the tools to create. That was the summer of 2001. Nowhere during that time did we even begin to contemplate any of the signal characteristics of MMORPGs or MUDs, like levels, directly inherited from Dungeons And Dragons.

CPU: There are a number of MUDs, though, that are strictly construction-based.

Ondrejka: There's no question that there's a bunch of stuff out there, and I'm sure Second Life would have had benefits if we had been more familiar with that space. But, like anything else, you bring the expertise you have, and you do the research you have time for. Then, of course, as we got further, there is a very active debate about the possible differences between 2D textual spaces and 3D interactive spaces. The beauty of the 2D text game—there are some great groups still working in that space—is that it's much like the early Web circa 1994. The fact that people can create really easily in text is important. The challenge that everybody has faced, going back to 1990 and Autodesk, is that creating in 3D is hard. There were very active debates about whether immersive 3D could ever be mainstream, and would game players be able to handle the confusion of being in 3D? Would its frame rates lead to nausea? Of course, in hindsight that was just a little bit silly.

But creating the content is really hard. In the middle of 2001, when we had the first primitive building tools in place, we had a board meeting; the folks who weren't in it—we had about 10 employees at the time—just started playing. We left the computer on, just as a window into the world, and over the course of the board meeting, the results were just spectacular. Suddenly all conversation around the table stopped, and everybody was just fixated on watching this city appear. At that point it was just so glaringly obvious that the interest was watching people participate in collaborative creation.

CPU: Did you know what would happen in that board meeting before you went in there?

Ondrejka: No. We had fun building, so we had sort of seen it, but that was really the first moment of watching five or six people aggressively try to build as fast as they could. It was just striking to watch—and to watch the reactions of the board members. That was when we had the epiphany that, 'OK, this isn't about a place; no place matters. It's as it is in all media: It's about people.'

We didn't have avatars—human representations of the users of the world—at that point. So there was a realization that we needed avatars, which led to, 'If we're going to do avatars, how do we make the avatars as customizable and unique as the world?' We tried to make them, and if we ran into something that we couldn't do, we would add more parameters and allow more flexibility. It was a really early design decision. Do we give people more power or less power? Do you make it simple, or do you make it powerful? When push came to shove, we tended to err on the side of complexity. For those who were willing to invest the time and learn how to use it, you could get interesting results.

It was really about giving people the tools to create.
—Cory Ondrejka

Nowhere is that more evident than in the scripting language that's somewhat like C, but with the worst elements of Perl sprinkled into it. Yet a very high percentage [something on the order of 15% of the folks who walk into Second Life in any given week] will dabble in it. They'll open a blank text editor and play with the scripting language.

CPU: Ambition is a wonderful goad to learning.

Ondrejka: It is. You can make things that matter here. When you see somebody drive by on his motorcycle, you ask, 'How did you make that cool motorcycle?' He can show you that script right then and there. It is not a case of leaving Second Life and firing up Visual Studio. It's right there: someone can show you what he wrote, and, in fact, point you on any given day to two or three classes in how to use the scripting language. People not only have the ambition to do things because they see all these great examples going by, but once they have the ambition, the resources to learn are there. We see this not just in scripting, but in building.

CPU: Approximately how many employees do you have right now?

Ondrejka: The developers who actually work on Second Life plus the sys admins, plus Q&A, plus program management, plus Web, is about 50 people; with around 20 of those programmers working on Second Life itself. So in the big scheme of things, we're still a pretty small game.

CPU: Is that for the best?

Ondrejka: No. At this point, I want to double it. We've gone long enough being lean and mean. We now have enough challenges that if I could wave a magic wand and hire 20 people tomorrow, I would.

CPU: In what area would you put them?

Ondrejka: Scaling, which means primarily a further data subdivision of MySQL. We have many MySQL installations that use the divide and conquer strategy. For us, it is a strategy of just partitioning the data and automating that process. That isn't done yet, and we aren't happy with the layer of management we've built over MySQL, either, so there's a lot of work to be done.

CPU: You mentioned earlier that you discovered Second Life was about the people and not about the place. A while ago we interviewed game designer Chris Crawford [July 2006 *CPU*, page 104] who suggested that a high rate of autism in Silicon Valley might explain why so many games were about doing things with objects instead of with people. What are your thoughts on that?

Ondrejka: I think that game programmers like anybody else pick the path of least resistance, and most games break down to relatively simple mechanics. Until recently, those mechanics were player vs. computer rather than player vs. player. It's really only when we get into the MMOPRGs that we start getting into really interesting questions about the dynamics that are going on. Certainly Second Life isn't a game by any possible definition; it just doesn't have any game-like qualities, though it shares a lot of vocabulary and technology with games. In Second Life it comes down to how people interact. At the end of the day, our success or failure is driven by the innovation of our residents. It's a completely different mindset that we first started getting a glimpse into at that board meeting.

CPU: Second Life had some problems with people copying content and not putting the time into making their own original content. How are you handling that right now?

Ondrejka: One of the truths of rendering space is that if you can see it, you can copy it. But even Copybot, which is a tool for duplicating the textures and geometry, still isn't capturing scripts. You can get a nonfunctioning duplicate of the car, but not the car itself. There's no question that if you are the creator, this will feel like theft, even if the law does not define it as such. The recourse, since there is no technological way of stopping it, is to fall back on law. If you hit up our DMCA contact and say, 'Hey, this is my copyright material, take it down,' we will

> Certainly Second Life isn't a game by any possible definition; it just doesn't have any game-like qualities, though it shares a lot of vocabulary and technology with games. In Second Life it comes down to how people interact. At the end of the day, our success or failure is driven by the innovation of our residents.
>
> —Cory Ondrejka

remove it from the system. Just as if you went to a Web site and saw your article published somewhere, you could hit up the owner of the Web site and request that it be taken down.

That's one piece of it. The second piece is that the value of a creator is never just the last thing they created. The value of a creator is always to be creative, to be innovating, and to be making the next thing. What's interesting is to look at the economy before and after Copybot. We've really tried our best to look for evidence that Copybot had hurt the economy in Second Life, but we couldn't find any. There was basically a two-day blip when the Linden Dollar lost value and then it bounced back.

CPU: To what do you attribute this lack of ongoing effect?

Ondrejka: Because wearing the best fashion in Second Life is not just about making a copy of it.

CPU: Regardless, couldn't Second Life Residents simply make multiple copies of an expensive item for very few Linden Dollars and sell them?

Ondrejka: At that point, they're breaking the law. Part of why we have legal regimes is to provide protection where technology doesn't suffice. In fact, there's a very strong argument that the law does a much better job in this domain than the technological approach.

CPU: Was there also a spike of complaints regarding the use of Copybot?

Ondrejka: There certainly was around the event.

CPU: But not since?

Ondrejka: No, not really. A lot of the store owners temporarily closed and put up signs saying, 'We're closing because of Copybot,' but those stores were open again very quickly. What happened was that if your favorite store was closed, you went to the store across the street. Again, none of this should be tremendously surprising because if you look at fashion in the real world, it isn't protected. There is no copyright on a dress. Thus, you want to be driving change all the time, so that when the knockoffs come in, you're already moving onto the next season.

CPU: The more power you give to your subscriber base, the more inclination they may have to mirror the real world. If they get that, they may mirror aspects of the world that some regard as offensive. This obviously includes pornography, however you define it, and there are MUDs and MUSHes completely dedicated to constructing worlds along those lines. How do you handle this issue?

Ondrejka: We handle it in a few ways. [Second Life] is broadly zoned into PG and Mature areas. There's no technology backing that, but it is a social norm and easy to report violations. It gives people who come into Second Life a choice. One of the very difficult decisions we had to make in early 2002 [when in private alpha] was when we had the first moment where a resident did something that offended one of our employees. We had the whole company sit down and talk about this: Is it our place to decide the things Linden Lab employees don't like in Second Life? We made what I think is the right decision, which is to say, no, that is not our place. Obviously, there are real-world laws, our computers are hosted in the United States, etc., but beyond that, we have a minimum set that allows this world to grow.

In Second Life the freedom to do whatever you want has led to things like stroke survivors self-organizing to build spaces for cognitive recovery, or immersive language training, or kids in Portugal working with facilitators to recover from domestic abuse. All of these things we could not possibly have foreseen. So I think our best approach is to be as hands-off as we can, while giving people good tools to find what they want and to not go where they don't have to. It's a little bit like wandering New York City: There's no question that you can wander around there and find things that would offend anybody. But that's part of what makes a city, a city. You have dynamically overlapping communities, tremendous innovation, and tremendous energy. Our goal should be that, not creating Disney World. CPU

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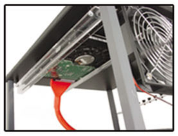

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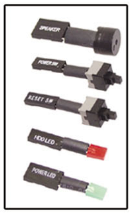


ATX Control Kit

www.highspeedpc.com

by Kristina Spencer

Under Development

A Peek At What's Brewing In The Laboratory

Bring In 'Da Noise, Groove To 'Da Funk

The next time you ride a bus, walk down the street, or grab a latté at the nearest café, take a good look around. The number of people you'll see with earphones connected to their MP3 players—and disconnected from the world around—is legion. Instead of complaining about his fellow humans tuning out, Noah Vawter, a graduate student in the MIT Media Lab's Computing Culture Research Group has created a device he hopes will encourage them to tune back in.

The device, which is called Ambient Addition, looks like an clear plastic iPod that has headphone and microphone jacks and a small digital signal processor. Microphones that are either attached to the headphones or carried by hand sample sounds from a user's immediate environment and transform them to create an interactive and ever-changing musical listening experience.

The iPod-sized Ambient Addition encourages users to create music from their environment.

The system uses two primary algorithms to process sounds, which Vawter has labeled the rhythm maker and harmony maker. The rhythm maker records short bursts of sound, such as a closing door, footsteps, or laughter, and lays them down in a repeating groove. The harmony maker filters incoming sounds by utilizing a series of preprogrammed chords, amplifying the sounds within the chord and downplaying those that clash. The resulting effect is a unique musical experience that encourages users to seek out different locations and situations in order to introduce new sounds to the system.

"About half of the people who try it simply listen, but the other half quickly tries to make all kinds of sounds to hear how they come out. They usually start clapping, tapping objects around them, or singing," explains Vawter.

Vawter's future plans for Ambient Addition include allowing musicians to choose their own chord sequences, adding controls so listeners can decide on the "mode" of music they'd like the system to create (spacy, noisy, dramatic, blues, etc.), and allowing people to use prerecorded music as a reference for chord changes and rhythms.

Although the prototype hardware is very expensive—in the $1,500 range—Vawter is hoping in the future to collaborate with Apple or other companies to build the system into next-generation MP3 players. ▲

Brain-Controlled Minion In The Making

If you've ever dreamed of making others do your bidding using your thoughts alone (insert mad cackle), researchers at the University of Washington may have just the minion, er, robot for you. Associate Professor of Computer Science and Engineering Rajesh Rao and his team have created a robot that relies on signals from the human brain to control its movement and basic actions.

To send orders to the robot, the controller wears a cap with 32 attached electrodes, which capture the controller's brain activity through EEG (electroencephalography) signals from the scalp. The controller watches the robot's movements on a screen via cameras mounted on and above the robot. When the object the controller wants the robot to retrieve lights up, the computer monitoring the process recognizes the brain pattern for "surprise." Reacting to that signal, the robot retrieves the object.

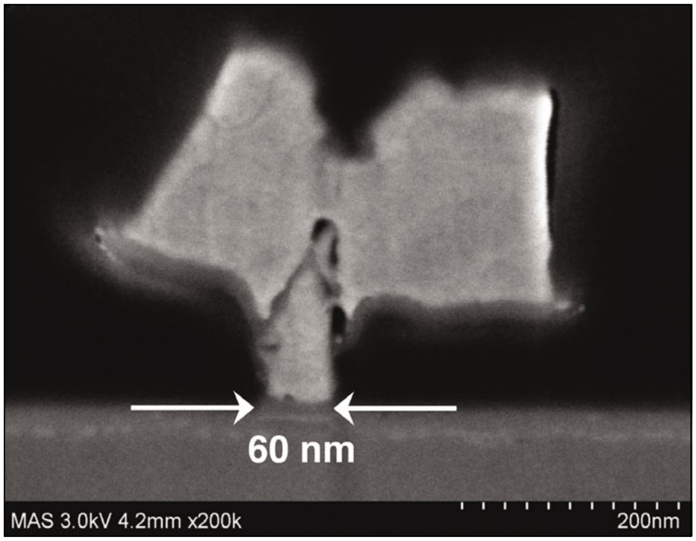
The bipedal robot can currently do only the simplest tasks, such as walking forward, choosing between one of two available objects, and bringing that object to one of two locations. But the researchers believe that their work demonstrates that robots could someday provide assistance to human companions who are unable to perform these kinds of tasks themselves.

"The basic idea of a noninvasive brain-computer interface for selecting items from a menu could be brought to market within a few years if there is a need for it," Rao suggests. "Such a system would be useful, for instance, to patients who are completely paralyzed."

But, he continues, the robotic side of the equation is not quite as far along. "A brain-controlled robot is still far from being ready for the market because robots are not robust enough yet to operate in natural human environments."

The Brain-Computer Interface research group is working on ways to give users more control over the robot's actions while maintaining the noninvasive brain interface. This is challenging because EEG signals are noisy, meaning they're not as specific as those from deep in the brain. To that end, Rao and his group are investigating the possibility of using EEG signals generated in the motor areas of the brain, as well as working to increase the robot's repertoire of basic behaviors, including skills such as avoiding obstacles, moving between rooms, and opening cabinets and doors. ▲

New Materials For New Transistors



A cross-sectional view of new InGaAs transistor shows the critical gate dimension of 60nm.

As transistors continue to shrink and Moore's Law approaches its limit, many scientists are turning their attention to man-made materials as potential replacements for silicon. Researchers at MIT's Microsystems Technology Laboratories, under the leadership of Professor Jesus del Alamo, have developed a 60nm transistor from one such material and showed its capability of carrying 2.5 times more current than today's advanced 65nm silicon transistors.

The team fabricated the new transistor using a composite material called indium gallium arsenide (InGaAs). Composite materials show promise as silicon's successors because of their superior conductive properties; electrons can move more quickly through them, and more current translates into faster speeds.

To create the prototype transistors, the team started with a complex layer structure grown by molecular beam epitaxy. Then they patterned the active area of the transistors, the contacts to the transistors, and, most importantly, the nanometer scale gate that controls the flow of electrons onto the wafers using electron beam lithography.

"We had to get everything right—a well-designed epitaxial structure, contacts with very low parasitic resistance, and . . . etching [several layers] very precisely," explains del Alamo of the challenges associated with creating the InGaAs transistors.

Although the 60nm transistors represent a significant step forward in the technology, del Alamo is already looking forward to what lies down the road. "We want to make even smaller devices, perhaps as small as 30nm. This will require a new electron beam lithography process and even finer semiconductor etching." ▲

Transparent Transistors, Invisible Screens

We love our big, thin, wall-mounted plasma screens and LCDs, but how much greater would the cool factor be if we could just point our remote at what appeared to be a bare wall or window to transform it into a video display?

That scenario isn't as far-fetched as you might think. A Northwestern University research team led by Tobin J. Marks, professor of Chemistry, Materials Science, and Engineering, has created a high-performance, completely transparent transistor, opening up possibilities for the development of "invisible" electronics that could be used as video screens or monitors.

A penny viewed clearly through an array of 70 indium oxide TFTs demonstrates the screens' transparency.

"You can imagine a variety of applications for new electronics that haven't been possible previously," says Marks in a recent Northwestern University press release. "Imagine displays of text or images that would seem to be floating in space."

The paper-thin transistors were fabricated using a combination of indium oxide and a multilayer of organic molecules. The assembly process is also inexpensive, taking place at room temperature on plastic or glass surfaces. Additionally, the transistors perform as well as or better than the silicon transistors found in today's LCD screens, overcoming the limitations of previous research work, which produced transparent transistors with very poor performance compared to their silicon counterparts.

Marks believes that prototype displays using the transistors could be available in 12 to 18 months. He has also created a startup company, Polyera, to continue development of the technology and bring it to market. ▲

Q&A With Tandy Trower

Tandy Trower has been managing new technologies for Microsoft for more than 25 years, starting with the software giant's first BASIC products. In December 2006, he took the wraps off his latest exploratory project: Microsoft Robotics Studio. This product is a software developer's kit that enables users to learn how to program robots and transport those programs across a variety of robot types and vendors. Trower's hope is that the tool will help jump-start the robotics market as it moves from the stuff of hobbyists and science fiction into mainstream applications in everyday life.

Q **What is Microsoft Robotics Studio?**

T It's an application development tool kit for different users that can span a wide variety of hardware and be applied to a diversity of applications. It isn't targeted for a single member of the community. It can be applied to anyone who has interest in robotics; for instance, a student or someone looking to build commercial applications. It has a low threshold for learning but a high threshold in terms of serious applications.

Q **What made you decide to begin exploring robotics for Microsoft?**

T It was a direct response to Microsoft receiving many contacts throughout the robotics community, from people using robotics for educational uses and academic research and in the commercial and industrial areas. All of them felt there was something significant happening in their communities and industries. They basically asked Microsoft to apply its software assets to provide a common ground that would allow the industry to move forward more quickly. So it was a direct response to an invitation from those in the robotics community to open up the market.

Q **So, Bill Gates heard some of this feedback directly from the robotics community as he toured universities in 2004/2005?**

T That's correct. In 2004, Bill was talking to a number of universities about the future of computer science. When he took tours of campuses, many academics would show him the innovative work going on and often those projects had to do with robotics. Also, Bill and I both followed the adventures of the participants in the DARPA [Defense Advanced Research Projects Agency] challenge, which is an indicator of how robotics is progressing. It went from one year when no one was able to get a robot car to finish the course, to the next year where several teams completed it. It really shows the interest level, diversity, and how fast the industry is growing.

Q **Can you give us some examples of how the interest in robotics is growing?**

T I mentioned the DARPA challenge. You look at the availability of robot technology for students today. Eight years ago Lego introduced its first Mindstorms robotics kit RCX based on 8-bit and infrared technology. When they first put that out, it turned out to be very interesting to a number of hobbyists out there. It encouraged Lego to move to 32-bit technology and Bluetooth with the latest NXT robotic kit. In the educational space, we have seen increasing availability of robots and horsepower. We saw the tremendous success of iRobot, which has sold more than 2 million Roomba vacuum cleaner robots.

Q **Robotics has been around since the earliest days of science fiction, but it hasn't yet lived up to many people's expectations. With technology advancing, do you think robotics is getting any closer to science fiction?**

T We've had visions going back a long time of creating these nonhuman entities that would do work on our behalf. The thing that has held it back before are the limitations of technology. With 8-bit technology, you quickly run out of horsepower. It's hard to do speech recognition or vision recognition. Now we have 32-bit tech at our fingertips. I think it will be a while before they can totally match our imaginations. Our imaginations are very wonderful things that let us think of things that keep us motivated. Not sure we'll see robots like we see in movies like "Star Wars," but we will see very practical things. We see robot technology like popcorn sensors in microwave ovens, antilock breaking in our cars, and dishwashers that adjust to how dirty the dishes are. I think artificial intelligence is still a ways off. I don't think we're going to see C-3PO or R2-D2 yet. ▲

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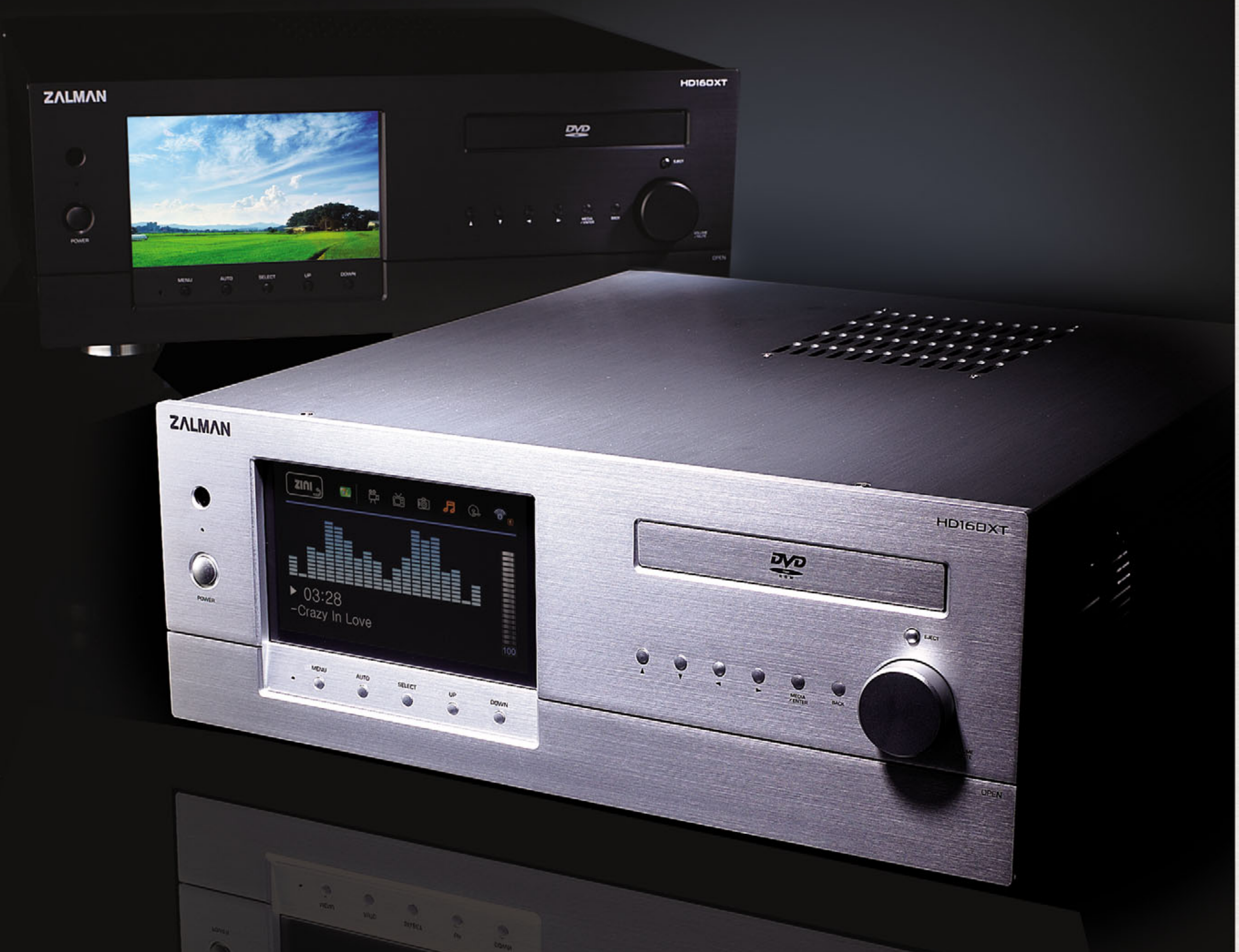

HD160XT HOME THEATRE PC ENCLOSURE

HD160XT is ergonomic design allows easy installation, and its 7" wide LCD TFT touch screen and remote control make it an optimal design for Home Theatre PC.

Remote control and multimedia software provided.

Excellent expandability with five 3.5" bays and one 5.25" bay.

Optimized cooling design with the use of air vents and low-noise and high-capacity fan.

7"Wide LCD monitor on the front panel is used as the main monitor, and various information such as the volume and fan speed can be monitored with the touch screen.

USB, IEEE1394 I/O Port, and Memory card reader installed on the front panel provides easiness in use.

For more informations, please visit our website, www.zalmanusa.com

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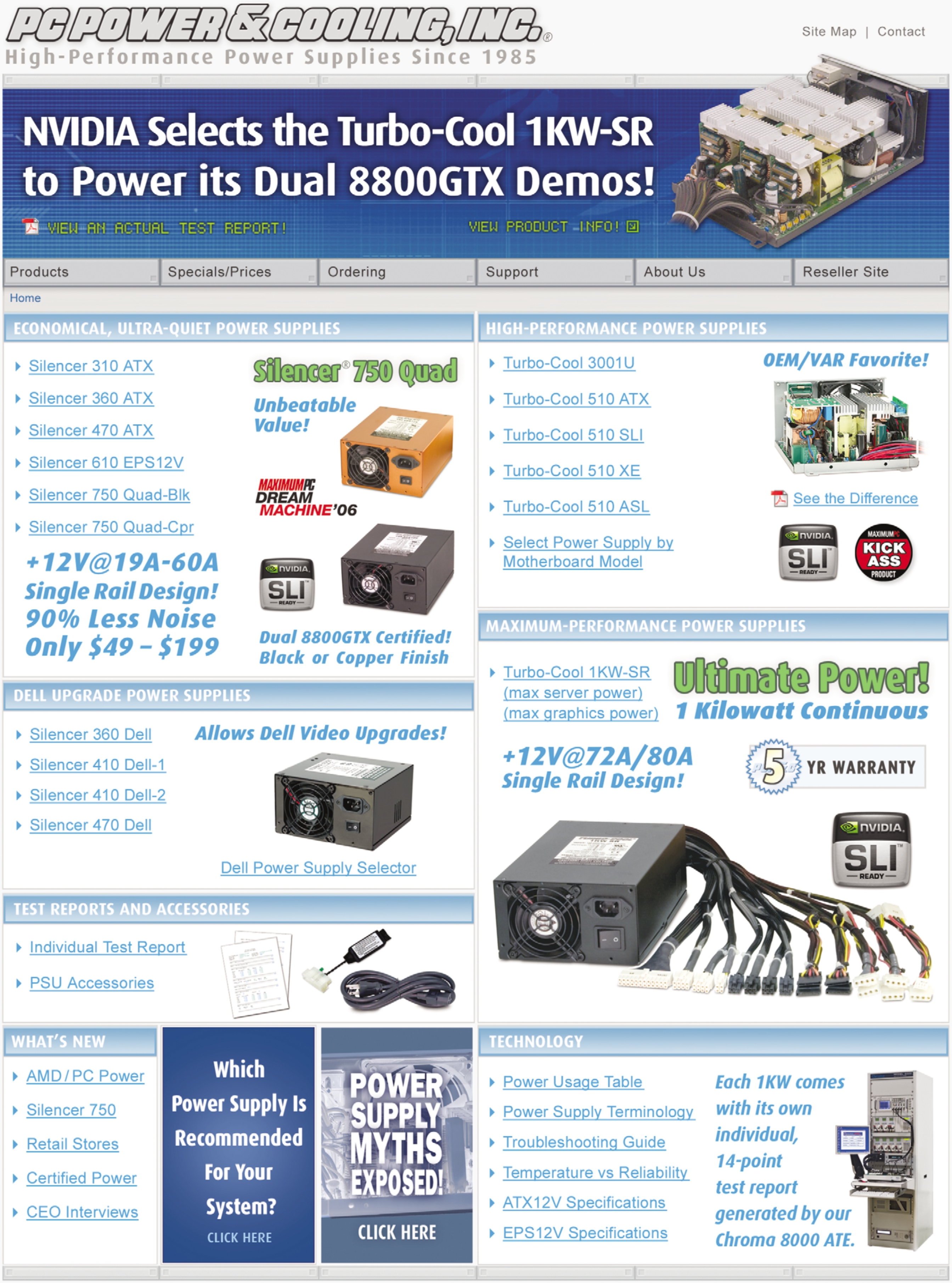

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